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ARCHIVES OF OPHTHALMOLOGY.

THE EFFECTS OF THE VARIOUS TOXÆMIAS UPON THE EYE.[1]

By Dr. W. H. WILMER, Washington, D. C.

IN 1626, there appeared a small book entitled *Two Brief Treatises Concerning the Preſeruation of the Eyesight*, by Doctor Baily, "sometime of Oxford" (the first writer in English upon Ophthalmology). He wrote: "The preſeruation of the ſight doth conſiſt, partly in good order of diet, partly in uſe of Medicines. . . . Whoſoeuer doth deſire to preſerue his ſight, let him take heed of the inequality of the ayre, of fire, ſmoake, winde, immoderate Coiture, much labour, ſuperfluous weeping, drunkenneſſe, ouermuch ſleepe, eſpecially in the daytime vpon meat, immoderate watchings: Let them alſo auoid meates that doe ingender vapours, ſuch as Cabbidge, Coleworts, Onions, Garlike, all ſharpe things, and Salt, Sallets, Beanes, and Peaſon, all fat things, whether they be of fleſh, or of oyle; all things of hard digeſtion muſt be auoided, & all things that are vapourous. . . . The eyes of a Crow hung about the necke, ſtrengtheneth a weake ſight, and doth preſerue the eyes: the roote of ſwines-graſſe or knot-graſſe, dryed in the decreaſe of the Moone, and hung about the necke, doth alſo conſerue and ſtrengthen the ſight, neither doth it ſuffer them to be inflamed."

The attempts of these early treatises to associate affections of the eye with general bodily conditions are very interesting;

[1] Read by invitation before the Section on Ophthalmology, New York Academy of Medicine, April 15, 1920.

but the prophylactic and curative suggestions, though most seriously expressed, seem laughable enough to us to-day. It will be fortunate for us if the efforts of the present generation do not appear equally ludicrous to our successors four hundred years hence. However, if Francis Bacon were writing now of medicine as a science, he could not say as he did three hundred years ago: "I find much iteration, but small addition."

The group of toxæmias forms one of the most important additions to the store of medical knowledge, and the literature upon this subject has been increasing most rapidly of late. The growing appreciation of the rôle of focal infections in diseased conditions of various widely separated organs is fortunately bringing the internists and the specialists into a closer relationship.

It is a far cry from Doctor Baily's "gemme of such worth" to the use of the X-ray, spinal puncture, complement fixation, and other modern methods of laboratory diagnosis. Sometimes both laboratory tests and clinical experience are sorely taxed in locating, with a reasonable certainty, the causes of obscure lesions of the eye. Yet it was not more than twenty-five years ago that practically all inflammatory conditions of the various tunics of the eye were classified ætiologically as syphilitic, rheumatic, gouty, or idiopathic.

At the meeting of the Section of Medicine, Southern Medical Association, in Memphis, Tennessee, November, 1917, an exhaustive and most instructive symposium upon oral sepsis was presented by some of the foremost clinicians of the country. The relation of oral sepsis to the digestive apparatus, the anæmias, thyroid deficiency, arthritis, the cardio-vascular system, and to the nervous system, was most ably set forth. But its relation to the eye was not included in this symposium, although from the standpoint of economics and of human happiness, the eye should be considered one of the most important organs in such discussions. In addition, the ocular tissues present great advantages for observing pathological changes during inflammatory processes. In the introduction to his *Diseases of the Eye*, published in 1840, Tyrrell says very concisely: "The investigation of the structure, of the functions and diseases of the organ of vision offers, therefore, to the student advantages and interest which are not afforded by

any other department of medicine or surgery; inasmuch as he can clearly see the origin, progress, and termination of diseased action in the more important textures; can learn how disease is modified in them by internal and external circumstances; and can observe the operation of the remedial agents employed."

To consider the eye in relation to all the various toxæmias, would be equivalent to a clinical treatise upon the diseases of that organ. In the scope of this brief paper, it will be possible to speak of only a few of the focal infections, or toxæmias, affecting the eye—those of the teeth, tuberculosis, and typhoid inoculations—passing by the fascinating lure of the tonsils, paranasal sinuses, gall bladder, appendix, genito-urinary tract, gastro-intestinal tract, salivary glands, and kidneys, as well as gout, syphilis, malaria, and the endocrine organs.

Dryden wrote:

> "The circling streams once thought but pools of blood
> (Whether life's fluid or the body's food)
> From dark oblivion Harvey's name shall save."

The blood stream, as we now know it, is not only a carrier of the elements necessary for life to all tissues, but it is also a sewer, and a purveyor of all secretions from the various endocrine organs. According to our present conception of focal infections, the bacteria from a distant focus, circulating in the blood or in the lymph canals, find a location that suits their taste, and there they start building a new home. Whether the new habitat is in the gall bladder, the kidneys, articulations, the endocardium, etc., or in the eye, depends upon differing circumstances—the bacillary strain, a slight injury, a sensitizing effect of some secondary focus, cold, oxygen tension, or other factors with which we are not familiar. It is also conceivable that the toxins—by-products of bacterial life—may also set up inflammatory conditions in widely separated organs.

The resistance of the normal tissue cells to these invading hosts makes the skirmish recognizable as a sign of abnormal conditions. The reactions may vary in degree from an endarteritis obliterans, or from a thrombosis of a small peripheral retinal vein, to a large plaque of chorioretinitis—the latter in its atrophic stage presenting a veritable "devastated area."

In his *Ocular Diseases Resulting from Dental Lesions*, Dr. Arthur D. Black says in regard to eye inflammations: "The latter are practically always due to an infection involving the peridental membrane, either in the form of an alveolar abscess at the root apex, or a pus pocket alongside the root. As probably not less than fifty per cent. of all persons having teeth present one of these conditions, the mouth is doubtless the most frequent offender in cases of secondary eye lesions."

As the age of the patient advances, the amount of crown and bridge work, and the number of devitalized teeth, usually increase; so that the mouth, as a source of sepsis, has to be examined with the greater suspicion. The deeper root infections can only be revealed by the X-ray. But even the X-ray under some circumstances fails to show a damaging source of infection.

Rosenow, in his excellent article, "The Pathogenesis of Focal Infections," says: "A blind abscess at the root of a tooth, infected pulpless teeth without rarefaction of bone at the apex. pyorrheal pockets about teeth, and infected tonsils, constitute a menace to the continued health of the individual. These walled-off areas of infection with little or no chance for bacteria and their products to escape except into the lymph channels and blood stream are veritable experiments which sooner or later yield results. These foci not only afford excellent entrance ways for the bacteria and their products, but they afford also the favorable conditions for bacteria to acquire peculiar infecting powers. It is this latter fact more than any other one factor which determines the localization in a given case. The conception, therefore, of the relationship of local foci to systematic disease must not be too mechanical."

Oral sepsis can be held directly responsible not only for external inflammations of the eye, but also for all types of uveal inflammation—iritis, disseminated chorioretinitis resembling retinitis pigmentosa, and especially large serous exudations in the choroid simulating, or actually causing, detached retina.

On October 16, 1919, the writer was consulted by Miss B., whose case had been diagnosed as detached retina. In fact there was a very large choroidal exudation lifting the retina in the lower temporal quadrant. In searching for the cause of this condition, all tests were negative except the teeth. The

eminent dental surgeon, Dr. Joseph Head, wrote in regard to this case: "The two teeth extracted for Miss B. were troubled with pyorrhea pockets on the sides and also had apical abscesses which unquestionably had come through the death of the pulps. Apical abscesses are particularly dangerous because pressure on the tooth causes an injection into the system of toxins and bacteria under a pressure of from twenty to sixty pounds, which is the force usually required for chewing food." After this source of infection was removed, there was a complete recovery of sight, and a full restoration of the normal visual field.

In the light of our new views in regard to tuberculosis (together with a better understood technique in making the tests), it is not surprising that a relatively large proportion of eye lesions are now found to be of a tubercular nature. In regard to these new views, Dr. Stewart says: "Woodruff (Lt.-Col. Charles E. Woodruff, M.C., U. S. A.) called attention to the present belief that every child is born free from tuberculosis, but soon acquires it, and that in every one the lesion becomes active sooner or later. He says that it is probable that all civilized people are tuberculous and undergoing constant auto-vaccination, causing an effective immunity. No one was ever infected in adult life. If incipient tuberculosis develops in an individual, it is, according to this authority, because something has interfered with his manufacture of antibodies."

Dr. Edward Jackson, in *Tuberculosis as a Focal Disease*, says: "But the facts that stand prominently forth in all the accumulated literature are: The tubercle bacillus gets entrance to the body usually long before any of the effects of its presence are recognizable, and often makes itself known first in the interior of the eye, in the head of the femur, or the bodies of the vertebræ. It has been known to enter the body without giving the slightest evidence at the point of entrance."

Dr. Jackson's description of the tubercle as a focal infection is classical. He says: "It exhibits all grades of pathologic achievement, from massing of leucocytes and the proliferation of fixed tissue cells required to resist invasion, through degenerated epitheloid and giant cells to fatty, cheesy, and calcareous masses of cell debris."

To the better understanding of making the tuberculin test, another source of helpfulness has been added—the fuller education of the laity in regard to the true nature of tuberculosis and their better coöperation in making satisfactory tests. Not long since, a young, strong, athletic patient who was undergoing the tuberculin tests, said: "I hope that they will be negative. I have the greatest horror of tuberculosis in any part of the body—it seems so dirty and horrible. I would a thousand times rather have syphilis." His case proved to be a typical one of tuberculosis of the retina. But he has accepted the positive findings, and he is now very happy over the improved eye condition.

There is another great element in dealing with the increasing number of eye lesions found to be tubercular—we are learning, in the case of adults, to have faith only in the subcutaneous test, and to use the boldness born of enlarged experience in giving the injections sufficiently strong to overcome the previous individual auto-vaccination.

Tuberculosis is as impartial as oral sepsis; and there is no tissue of the eye that is not influenced by the tubercular process. But in the writer's experience, it shows an especial predilection for the cornea, the retina, and the uveal tract. But the retina affords the best opportunity for studying with the ophthalmoscope the various pathological changes. Here, one can also detect slight focal reactions to the tests. In a recent article upon "Tuberculosis of the Retina," by Dr. Jackson and Dr. Finnoff, the authors state that: "Retinal tuberculosis begins by the appearance of white infiltrates in front of certain retinal vessels, most frequently veins. Later these particular vessels show all the signs of perivasculitis and the affected portions of the veins may be altered in caliber. At this stage hemorrhages occur and the patient is likely to first come under observation for impairment of vision."

There is a type of retinal inflammation, usually of tubercular origin, that is of deep interest and of great economic as well as humane value—recurrent hemorrhages of the retina in young adults, chiefly males. Before the true nature of this process was understood, the history of these otherwise healthy and vigorous young persons usually showed years of unproductiveness and apprehension, with finally the loss of one eye or both.

In addition to other cases, Dr. A. E. Davis and Dr. Finnoff have each reported a case of this general type.

The following case is reported in some detail on account of the unusual good health of the patient, the long continuance of the trouble, the negative reactions to several Von Pirquet tests, the positive reaction to the subcutaneous injection, and the final improvement as the result of the therapeutic administration of tuberculin.

J. B. W., 25 years of age, first consulted the writer on February 3, 1920. He gave the following history: Recurrent attacks of iritis in the left eye during 1913 and 1914. In March, 1915, noticed large floating specks in front of the left eye. They gradually became larger until a month later when that eye became practically blind. Consulted an oculist who found the vitreous of the left eye filled with blood. A few months after loss of sight of this eye, black specks appeared in the right eye, later taking the form of long floating lines. In August, 1917, a large hemorrhage occurred in the retina of the right eye. This became absorbed after two months' stay in a hospital. During the past few years, the patient has kept rather quiet, but small hemorrhages have continued to occur up to the present time, causing both visual disturbance and great apprehension. The patient said: "I have been thoroughly examined and the doctors cannot find any cause for the trouble. I am not a bleeder."

Family History.—Negative. One brother and one sister living and very strong. Father very healthy, mother died of pneumonia.

Personal History.—Very robust and athletic. Tonsils removed two years ago. Sinuses reported clear. Two suspicious teeth have been extracted. Present condition: Complains of not seeing with left eye. Lines and spots before right eye. Lower portion of all lights appear red. R. E. V. = $\frac{20}{20}$ J1 at 6″ without glass. L. E. V. = $\frac{1}{200}$. R. E. field, blind spot, light sense, color sense, and pupillary reaction, all normal. Fundus R. E.: Thrombosis of a branch of superior nasal vein, inferior temporal vein, and of a vein in the extreme nasal periphery, on the level with the disk; white infiltrates around thrombi; perivasculitis, many minute hemorrhages scattered through the fundus, especially near the site of the upper thrombus. Numerous dark brownish discolorations in the lower portion of the retina over the ora serrata—evidently the remains of previous extensive hemorrhages. Vitreous clear. L. E. : Scar in retina and choroid above the macular region, with a dense band of

organized fibrous tissue in the vitreous stretching horizontally over the macular region and papilla, constituting a retinitis proliferans.

Report by Dr. W. C. Moore of physical examination and laboratory findings: "A well developed and well nourished young man, weighing 176 pounds, height 5 ft. 10½ in. with acne scattered over back, chest, and shoulders, mucous membrane pink. The left tonsil has been removed and there is a small portion of the right tonsil left.

Oral hygiene good; teeth show a number of fillings but are in good condition. There are no capped teeth. Thyroid is not palpable.

Lungs.—Expand equally on the two sides and the lower borders move freely on deep inspiration. The percussion note is resonant, and the breath and voice sounds are normal.

Heart.—Area of cardiac dullness is normal; apex 5th int. space inside left mam. line. The sounds, both at apex and base, are clear and distinct; P2 greater than A2, neither accentuated. Pulse 66, regular in f. and f., and of good volume. Vessel walls are soft.

Blood Pressure.—120 sys.—70 dias.

Abdomen, genitals, and extremities negative.

Reflexes.—Both superficial and deep are present and normal, and equal on the two sides.

Laboratory Examination.—Urinalysis (voided spec.): Very light, clear, faintly acid; 1010; albumen negative; sugar negative, acetone and diacetic acid negative; indican, negative.

Microscopical Examination.—A few urates and epithelial cells, and very few leucocytes are seen. No casts nor red blood cells. Twenty-four hour urine is 1050*cc* in amount; 1018, sp. gr., with other characteristics same as above.

Blood:	Hæmoglobin.....	90% (Talquist)
	R.B.C.....	5,400,000
	W.B.C.....	10,000 (Average on two different occasions.)

Differential:

Polymor.....	53 %
Sm. Mon.....	26 %
Large Mon.....	16.5%
Eosinophiles.....	2.5%
Basophile.....	1 %
Transi.....	1 %

200 cells counted. No abnormal R.B.C. seen; coagulation slightly prolonged 7 mins., control 5 mins. (on glass rod at normal temperature).

Feces.—No ova or parasites seen; a few undigested vegetable fibers; no starch or meat fibers seen.

February 5th. Dr. Dabney requested to examine patient's nose, throat, and ears. Reported small tonsillar tag on right side which contains pus which on culture has grown the streptococcus viridans.

Dr. Hough reports cerebrospinal fluid negative in all respects. Blood Wassermann negative. Dr. Christy reports X-ray of teeth and sinuses shows no evidence of infection or abnormality, that "examination of the chest shows rather marked infiltration at both hila and some thickening along the main trunks, extending to the lower lobes of both lungs. The appearance is that of an inflammatory process beginning at the hila. The exact nature of the process cannot be stated, but the appearance is not that of tuberculosis." Von Pirquet negative.

February 7th, tonsillectomy.
February 10th, W.B.C. 12,600.
February 12th, W.B.C. 8,600.
February 14th, W.B.C. 8,400.
February 16th, W.B.C. 10,000
February 18th, fresh hemorrhage in retina of right eye.
February 20th, W.B.C. 8,600.

The retinal picture being typical of a local tuberculosis (in spite of the infected tonsil and the negative Von Pirquet) on February 29th tuberculin (O. T. human type) 0.5*mg* subcutaneously. Slight general and local reaction. March 4th, tuberculin 1.25*mg*. Marked general, focal, and local reaction. Since that time, therapeutic doses of tuberculin have been given twice a week, beginning with $\frac{1}{10000}$*mg* and increasing the dose each time by $\frac{1}{10000}$*mg*. The condition is improving and the patient feels that the vision is clearer.

Since the second provocative injection there have been no more observable fresh retinal hemorrhages, and the white areas of infiltration have cleared up markedly. Although the patient was in splendid condition before, he has gained ten pounds, and he is feeling most hopeful about the future outcome of his case.

To illustrate another type of tuberculosis of the retina, the following case is cited briefly.

On January 7, 1920, Mrs. P. W. B., 26 years of age, consulted the writer. She was rather thin and anæmic. All of the tests made at her home had been negative except for the report of a chronic cholecystitis. Dr. W. S. Franklin wrote:

"Right fundus: Nerve head slightly blurred, nasal margin. Numerous grayish streaks follow the peripheral arteries some of which are obliterated. In the lower quadrant, two large masses of exudate are suspended respectively 3 and 5*mm* anterior to the retina. Left fundus: Nerve head clear. Five grayish streaks following the ora serrata (nasal side)."

R. E. V. = $\frac{20}{40}$; L. E. V. = $\frac{20}{20}$.

On January 27th, the following report was received from Dr. J. W. Lindsay: "Gave injection $\frac{1}{10}$ *mg.* of $\frac{1}{1000}$ O. T. Several hours later, chill, general pains, headache, nausea, faintness, local soreness at site of injection, temperature reached 102.4°." There was also an increase of the local disturbance particularly in the right eye. The patient returned to her home with suggestions in regard to hygiene and therapeutic administration of tuberculin. The mother of the patient wrote recently that the daughter's last visit to her oculist "encouraged us all. He reported a very marked improvement in the condition of the eyes, said the white streaks were rapidly disappearing, and he was convinced that we were on the right track." This case differs from the previous one in several particulars —the general condition of the patient (a young woman) was very poor; the arteries were attacked primarily; the retina was clear of hemorrhages.

However, cases of recurrent retinal hemorrhages are not all of tubercular origin. The writer saw a healthy young man of twenty-four years of age some eight years ago, whose vision was reduced to $\frac{1}{200}$ from recurrent hemorrhages in the vitreous. All sources of infection in this patient were excluded except the teeth and the intestinal tract. The patient, however, suffered markedly from constipation and had a bad case of pyorrhea alveolaris. Upon the removal of the source of infection, within seven months, the vitreous entirely cleared up, leaving a normal vision. There has been no return of the hemorrhages.

There is only one more type of toxæmia that there will be time to speak of even briefly—the eye lesions which can follow anti-typhoid inoculations. A careful study of this type of toxæmia is of great importance owing to the far-reaching economic and medical values of the inoculations themselves, and also because it is not recognized generally that there is a possibility that affections of the eye may occur after the inoculations.

That the involvement of the eye is not generally realized is illustrated by the following statement of Lt. Col. H. J. Nichols, M.C., U. S. A., quoted by Dr. Phinizy Calhoun: "No doubt slight effects could be found in certain cases, as the eye undoubtedly will share in some of the general reactions, but I do not believe that these effects on the eye can be of much importance, as among the vast number of men who have been inoculated and followed up in the Service we have no records of any specific damage to the eye as the result of typhoid inoculations, and so far as I know, there is no specific lesion in the eye during a course of typhoid." In his article, "Ocular Complications Due to Typhoid Inoculations," Dr. Calhoun reports five cases occurring in the course of typhoid inoculations, three occurring in the Service and two in civil practice. In every case, the trouble occurred after either the first or second injection. Two of the cases suffered from uveitis and three from iritis; one gave a history of previous gonorrheal infection; in one there was a + Wassermann. The ages of the patients varied from 20 to 40 years.

In discussing this paper, Dr. George H. Bell reported a case of double deep keratitis following anti-typhoid inoculations.

Dr. Walter B. Lancaster stated that he had not seen a case of uveal inflammation following these inoculations but that he had recognized over twenty cases of neuropathic keratitis. Altogether, iritis, uveitis, chorioretinitis, retinal hemorrhages and lesions of the cornea have been found to be aftermaths of anti-typhoid injections. Dr. Calhoun quotes de Lapersonne's advice: "that it would not be advisable to inoculate syphilitic, tuberculous, or arthritic patients who have had lesions of the uveal tract especially after the fortieth year."

In view of the rather scant literature upon the subject, the report of the case of a patient who has recently consulted the writer, may be of some interest.

P. E., 23 years of age, had served two years in the navy. He was not inoculated upon entrance into the Service, but he was given a lipo-typhoid injection upon his discharge March 22, 1919. He gave a history of a right-sided mastoid three years ago, removal of tonsils in January, 1917, and extraction of bad teeth and scraping of bone fourteen months ago. At the time of the inoculation, there was a history of

a cold with evidently a sinus involvement. Immediately after the inoculation, there was a general reaction. The right eye became badly inflamed. As the inflammation disappeared, patient noticed that there was a central blind spot. Shortly afterwards, he began to have trouble with the left eye—seeing "whirligigs," etc.

Present examination, R. E. V. = $\frac{10}{200}$ eccentric; L. E. V. = $\frac{10}{15}$. Pupillary reaction normal. Left eye color sense normal, light sense normal, fields for white normal. Interlacing of color fields. Blind spot markedly enlarged. Fundus of right eye, a central spot of chorioretinitis surrounded by small hemorrhages. In the left eye, two small peripheral spots of chorioretinitis, each one adjacent to a retinal artery. Dr. Joseph H. Bryan reported: "Marked chronic bilateral maxillary sinusitis with an acute exacerbation; deflected septum to right which interferes with drainage from right sinuses. Operation indicated." That this eye condition was due to the inoculation, is reasonably probable from the fact that a marked general reaction followed, and that the eye complication occurred immediately after the injection.

It is difficult to explain why this immunizing treatment is followed by eye lesions in some cases and not in others. However, one may conceive that the occurrence is explained by the varying age of the solution, the general lowered resistance of the subject at the time, and the sensitization of the eye tissues by some pre-existing toxæmia. In this case, the long-standing sinusitis furnished the necessary sensitizing medium.

In reviewing the literature of the toxæmias in the light of one's own experience, there are some facts that stand out with especial prominence; and Dr. Barker's advice to the internist is equally valuable for the ophthalmologist in his search for the cause of some obscure ocular affection. He says: "In looking for focal infections, I think the practitioner will be helped if he remember that most often in children the primary focus is in the tonsils or adenoids, and that in older people it is more often the teeth, paranasal sinuses, or the gall bladder."

However, the source of infection is often a mixed one, such as a combination of teeth and tonsils, tuberculosis with cholecystitis, etc. Certain portions of the intestinal tract, with its abundance of lymphoid tissue, serve as important sources of toxins. Whether this is primary, or secondary, to sepsis in the mouth or throat, it must be investigated in every case.

No part of the eye is immune from the possibility of damage from some toxic process in a distant part of the body. It is the writer's conviction that improved laboratory methods will show that the relationship between lenticular opacities (even in older people) and some focal infection, is a closer one than is now believed to exist. The writer has recently seen a number of cases of an interesting group, the ages of the patients varying from 32 to 40 years, all cases showing the common feature of a milky-looking lens, a discolored iris, and an increase, or marked decrease, in intraocular tension. The apparent cause of the original low-grade uveitis in these cases has been oral or tonsillar sepsis, or both.

Pathological conditions of the organs of internal secretion—though secondary to some distant source of toxæmia—have an important bearing upon some types of inflammation of the uveal tract.

In some cases of retinal hemorrhage in people over fifty years of age, some focus of infection, as the teeth or tonsils, gives an ophthalmoscopic picture resembling an arteriosclerotic process. But the hemorrhages and white degenerative plaques clear up remarkably after the complete removal of the septic source. This improvement is often accompanied by a lowering of the general arterial hypertension.

It is very necessary for the ophthalmologist to be able to interpret in a general way the X-ray findings in regard to the teeth, so that he may coöperate with the dental surgeon by advising the best method of procedure in dealing with certain types of oral sepsis. For example, when there is an apical abscess at the root of a surviving molar that is being used as a pivot for bridge work, the ophthalmologist must be able to decide not only that the eye lesion is sufficiently serious, but that the picture is sufficiently clear-cut to warrant the sacrificing of that important tooth. There is a tendency in one school to extract all suspicious teeth, while the opposite school depends too much upon expectant treatment. It is well to remember that in the case of the eight upper central, and the six lower central, teeth, apical abscesses can be removed and the teeth saved by the surgical procedure of root resection.

In adults, the only reliable test for ocular tuberculosis is the subcutaneous injection of tuberculin—preferably old tuber-

culin. The temperature should be taken every two hours for two days before the first diagnostic injection; and it is also important to have an X-ray of the lungs. In all cases, it is the part of wisdom to make the first injection small. This is especially true in acute lesions involving the retina or choroid. In adults, the first dose should not be over .5*mg*. O. T. At the end of four days if there has been no positive reaction, 1.25*mg*. may be given. It may be necessary to increase the dose to as much as 5*mg*. before one can be satisfied that the test is really negative. Following the injection, while the general and local reactions are being watched, the eye must be carefully observed for a positive focal reaction. The necessity of giving very small curative doses at the start, is emphasized by all ophthalmologists of large experience. In most cases, the therapeutic injections of tuberculin are very efficacious when accompanied by the proper regimen and hygiene.

In typhoid inoculations in civil practice, it is wise not to give the inoculations as long as there is any evidence of the existence of any focal infection.

In past years, many ocular inflammations were considered syphilitic when the etiology was not very clear, and the affection yielded to anti-syphilitic treatment. But it is a clinical fact that often non-syphilitic lesions of the uveal tract are favorably influenced by anti-syphilitic treatment. Also, long protracted lesions are helped by the administration of the extract of certain glandular organs—such as the thyroid extracts. However, the contrary is also true. The writer has seen a few very severe cases of plastic uveitis following large doses of thyroid extract self-administered for the reduction of flesh. In every case the general nutrition suffered severely with the rapid reduction in weight.

When the leucocyte count is high, the successful elimination of some of the toxic sources is indicated when the repetition of the count shows a reduction.

In some of the writer's cases that exhibited very severe oral sepsis, there has been an increase in the protein content of the spinal fluid without any other detectable cause for this increase. This clinical fact suggests the possibility that the toxins may enter the central nervous system either along the lymphatics of the nerve sheaths or through the blood stream itself. The

resulting irritation might account for the increased protein, whether the cerebrospinal fluid finds its source in the general serous cavities—as Dr. Dercum believes—or in the choroid plexuses.

Whatever may be the etiology of the ocular expression of the toxæmia, there are certain principles of therapeutics that assist nature in rehabilitating the injured tissues. The first, of course, should be the eradication of all toxic sources; then a simulation of nature's own measures by bringing increased numbers of leucocytes to the "zone of activity." This may be accomplished by the local use of hot applications and, at certain stages of the inflammation, dionin and subconjunctival injections of normal salt solution. It is obvious that nearly all involvements of the anterior portion of the uveal tract will require the local use of atropine. At the same time any deficiency in the secretion of the glandular organs should be supplied by the proper organ therapy. Dr. Rogers ingeniously suggests the possibility of the patient with hypothyroid disturbance being unusually susceptible to atropine when the least bit fatigued, owing to the failure both of the vagus and the sympathetic systems. In the case of retinal hemorrhages, accompanied by a prolonged coagulation time, the use of the lime salts is indicated. In all toxæmias, in addition to the suggestions regarding hygiene, the gastro-intestinal tract must receive attention both in regard to diet and therapeutics. The writer would emphasize strongly the application of these measures while the source of the toxin is under investigation.

In 1892 the great Lister, in his words of appreciation of Pasteur, said: "You have raised the veil which for centuries had covered disease; you have discovered and demonstrated their microbian nature." In the wonderful soul of Pasteur was born the spirit of the renaissance of scientific medicine. With his lifting of the veil that obscured the nature of disease, the ensuing years will bring a fuller knowledge of the life histories of bacteria, of the bio-chemical changes going on in the body during health and disease and of the pathological alterations of the endocrine organs. The application of this knowledge will result in the discovery of the often unsuspected sources of chronic toxæmias, and in their elimination before damage can result to the joints, the muscles, the heart, or the

sight. Prevention rather than cure, approaches more nearly the goal of all medical efforts—the eradication of disease. And the words of Disraeli are as applicable to the future as they were to the past:

"Public health is the foundation on which reposes the happiness of the people and the power of a country."

ILLUSTRATING DR. GIFFORD'S ARTICLE ON "FUSIFORM BACILLI ON THE CONJUNCTIVA AND IN THE MEIBOMIAN GLANDS."

FIG. 1.—Smear from Case I. (The bacilli stained pink with carbol-fuchsin and showed only faintly in negatives. Attempts to restain with gentian-violet deposited so much debris that a clear photograph could not be taken.)

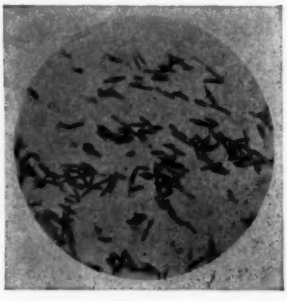

FIG. 2.—Three-day agar culture from Case II.

FUSIFORM BACILLI ON THE CONJUNCTIVA AND IN THE MEIBOMIAN GLANDS.

By Dr. SANFORD R. GIFFORD, Omaha, Nebr.

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(With two illustrations on Text-Plate XV.)

IN view of the increasingly recognized prevalence of trench mouth or Vincent's angina, it seems worth while to report the occurrence of fusiform bacilli morphologically very similar to those found in this condition, in two unusual locations.

Case I. was a woman of 42 who showed a peculiar ulcer surrounding her left lower tearpoint. A year before, Dr. Vercoe had removed a small concretion from the left lower canaliculus of which no smears were made. Since that time, she had noticed this peculiar appearance around the tearpoint but had suffered no pain from it, and only came into the office for the removal of a foreign body, which was found on the left upper tarsus. It was then that the unusual ulcer was discovered. It was covered with a thin whitish membrane, and on touching with a probe, the tissue around the tearpoint was found to be softened to a depth of about three millimeters so that a little pocket of softened tissue was formed around the canaliculus. The continuity of the canaliculus, however, was uninterrupted, as fluid could be injected through the punctum into the nose. The patient suffered no pain from the ulcer and lacrimation was only slight. Since an ulcer of this appearance and location was new in my experience, smears and a culture were made. Smears from the membrane showed a mixture of organisms such as is often found in ulcers of the pharyngeal mucosa. There were Gram-positive diplococci and a fairly large number of long irregularly shaped organisms, mostly Gram-negative, some with tapered ends, large in the middle and of

a definitely fusiform appearance. A few showed the typical arrangement in pairs with the thicker ends together, the more tapering ends in opposite directions, shown by the fusiform bacilli in Vincent's angina. The granules staining deeper by Gram which have been noted and which I believe are one of the most characteristic marks of these fusiform bacilli were not seen, but the counter-stain in this case was unusually deep. There were a few longer, more slender Gram-negative fibrils, curving irregularly and a very few whose curves made them appear like rather atypical spirilla, but these may have been fibrin and it cannot be said that spirilla were present (see Fig. 1). The culture was overgrown by a Gram-positive spore-bearing bacillus and no fusiform bacilli could be found, only the spore-bearer and staphylococci. Since the patient was having no symptoms, only a mild zinc collyrium was prescribed and she was asked to return in a few days. She did not return until six weeks later, in response to a note, when she stated that for two weeks after her visit she had suffered with what seemed to be an acute conjunctivitis, with swelling of both lids. This had cleared up and now the ulcer was completely healed, showing only a slight flattening and tenseness of the mucosa around the tearpoint, which was patent. There was no watering and the eye felt and appeared normal. Whether the acute attack bore any relation to the ulcer is hard to say. It may have been an acute conjunctivitis due to some other infection introduced with the foreign body which was removed.

CASE II. was that of a seven months old baby whose left eye showed an extreme condition of chalaziosis. Both lids were fairly riddled with chalazions, of which there were at least fifteen, mostly small ones, in either lid. The cornea and ocular conjunctiva were normal. The right eye showed two small Meibomian concretions of the upper tarsus which were removed, but was otherwise normal. Dr. Harold Gifford opened and curetted out all the more considerable chalazia, obtaining a yellowish semisolid purulent material. Reports from the parents state that one month after operation, the baby's lids still become somewhat inflamed at times, and that small areas of swelling appear, which resolve without forming pustules. Two months later, they state that the lids are to all appearances normal. Smears of this purulent material showed pus cells and debris of broken down cells. There were a few round single spots staining Gram-positive which might have been taken for staphylococci, but as no staphylococci grew in the culture, they were considered

as debris or precipitate of the stain. The smears were destroyed before the cultural findings were obtained which would have urged a more thorough examination. Smears of pus, which was left on the agar slant twenty-four hours, however, showed many bacilli like those to be described.

Culture on plain agar showed in twenty-four hours a well-marked clear yellowish growth along the needle track. On smears, it proved to be a pure culture of a peculiar fusiform bacillus, thicker at the centers, with tapering points, some arranged in pairs (see Fig. 2). Most of the organisms were markedly Gram-negative but a fair number showed two to four Gram-positive spots near the center and a few organisms were completely Gram-positive. Some showed a less marked spindle-form, but the generations from a single colony on a plate showed a great predominance of the spindle-form, so a pure culture was evidently obtained. The bacilli showed independent motility, often of a tumbling, twisting type.

The organism grew fairly well at 37 degrees centigrade on all ordinary media, very slightly at room temperature. On agar the growth was rather characteristic, being shiny, slightly raised with rounded edges, and remaining always much more transparent than the growths of most other Gram-negative bacilli. The colonies were clear, round, and discrete, resembling meningococcus colonies but growing slightly more yellowish. In broth, it produced little balls of flocculent sediment which formed a mass at the bottom of the tube, leaving the broth clear. Litmus milk was slowly turned a deep bluish-purple but its consistency was unchanged except for a similar sediment. On blood plates, the colonies produced a small ring of complete hemolysis. No odor ever developed in the cultures. It produced no gas in sugar media.

In cultures three or four days old, a large number of disintegrated bacilli and involution forms were found, some of which were threads eight to ten microns long. At this time, also, clear spore-like terminal bodies were seen, some of which stained by Moeller's spore stain. After boiling for 1½ minutes, it was still capable of transfer, so evidently true spores were formed. No spirilla were ever found in culture.

Two intraperitoneal injections in guinea pigs were without positive results. One pig died in seven days but the organism

was not recovered so death may have been accidental. Two injections in the vitreous of guinea pigs were positive. One showed a well-developed vitreous infection after four days with cloudy cornea and peri-corneal injection. After six days, the reaction was diminishing, leaving an opaque mass in the vitreous. At enucleation seven days after injection, the vitreous was turbid and a fair number of fusiform bacilli were found in smears. A few were found in cultures but they were overgrown by a contaminant. The second guinea pig showed evidence of panophthalmitis the day after injection, which was somewhat decreasing in severity at time of enucleation six days after injection. The turbid vitreous showed many fusiform bacilli and three cultures from the vitreous showed them in pure culture. Both animals lived, and aside from some loss of weight, showed no general effects.

In comparison with the fusiform bacilli of Vincent's angina, the present organism showed a great predominance of Gram-negative forms, much greater than I have usually observed in smears of Vincent's angina, but as elsewhere noted smears from different cases vary within wide limits in this respect. In cultures, Weaver and Tunnicliff and others have found them Gram-negative except in the dark spots they describe. The bacilli were also thicker at the center than most of the organisms seen in smears of Vincent's lesions. The characteristic granules were seen in both organisms.

Dr. Tunnicliff, to whom I sent a culture of the organism from Case II., very kindly examined it for me and gave as her opinion that it is not bacillus fusiformis, though it is fusiform in shape. She notes that bacillus fusiformis is an anaërobe with an offensive odor and more slender than this organism in culture. She thinks the term bacillus fusiformis is being used to designate several different bacilli.

Certainly bacillus fusiformis has always been reported as at least a relative anaërobe. As Dr. Tunnicliff notes, however, it may grow aërobically in mixed culture. Krumwiede and Pratt (10) and others have noted their growth on aërobic plates with pyogenic cocci. One may conceive of aërobic forms of such a little known organism, as one knows of anaërobic forms of streptococci. Though this probably is not the same organism as the bacillus of Vincent's angina, its being

Gram-negative, and its rather uniformly fusiform shape seem to me to exclude it from the diphtheroids, and there seems to be no organism with whose morphology it so nearly coincides as bacillus fusiformis. I would place it, then, as at least a related organism, in the still somewhat undefined group of fusiform bacilli.

Literature.—Aside from their frequent presence in lesions of the tonsils and gums, the presence of fusiform bacilli in lesions of many other parts of the body, both with and without spirilla, is becoming more widely recognized of late years. Their occurrence in noma, usually with the spirilla, but occasionally without them, is well known. Weaver and Tunnicliff (1) have summed up the literature on this form of infection, Dick (2) found fusiform bacilli at seven post mortems in six different lesions, two from the meninges in meningitis, and one each from cerebellar abscess, gangrene of the lung, pneumonia, empyema, and peritonitis. Three of these strains were cultivated. In most of these cases, pyogenic cocci were found with the fusiforms, but no spirilla. Vincent (3) in 47 cases of hospital gangrene, found them with spirilla in 40 cases, without spirilla in seven. Veillon (4) found them without spirilla in several cases of appendicitis. He grew them in pure culture, and injections of this produced small abscesses in guinea pigs and rabbits. Schmidlechner (5) reports a case of fatal puerperal sepsis in which he found fusiform bacilli and spirilla in smears from deep ulcers on the nymphæ and vagina and from necrotic material in the uterus. He mentions Matzenauer's having found it in gangrenous ulcers of the female genitalia and that Róna found it in many such cases, describing a deeply destructive form of lesion resembling noma of the mouth. Beitzke (6) in a thorough review of the literature up to 1904, mentions its occurrence, usually with spirilla, in gangrenous laryngitis (Bernheim and Pospichill), antrum infection producing, in one case—fetid bronchitis with metastatic abscess of the thigh (Lichtwitz and Sabrazés) and in the dysenteric movements of a dog (Niclot and Marotte). The author found a fusiform bacillus at post-mortem in smears from the ulcerated gum, alveolar abscess, larynx and large and small bronchi of a case of broncho-pneumonia.

Dr. James R. Miller of Hartford, Connecticut, tells me of

finding many fusiform bacilli and a few spirilla with pyogenic cocci in an abscess at the base of the brain at post-mortem. The abscess was secondary to an alveolar abscess. Dr. E. G. Cary of Omaha says he has seen one case of what looked like a primary lesion on the glans which showed a profusion of both organisms and was found not to be luetic. Mellon (13) saw a case of gangrenous balanitis in which fusiform bacilli seemed to be the causative organism. Though usually producing only local lesions by direct extension, that fusiform bacilli can enter the blood stream and produce metastatic abscesses is shown by Feldmann's case (7). Babes (9) describes a case of infection with a fusiform bacillus which differed from the usual type in growing aërobically. At post-mortem on a child who died eight days after birth, apparently of general infection from an infected navel, he found in smears of the blood and viscera slender bacilli with pointed ends which grew alone in nineteen out of twenty-one aërobic cultures from different organs. It was pathogenic for rabbits and guinea pigs. The small, shiny, transparent colonies becoming yellowish in older cultures which he describes seem to indicate a great similarity to the organism described in Case II. of the present report. Mellon (13) has recently described a fuso-spirillary organism isolated from the blood, pleural fluid, sputum, and renal abscess of a case. From the great variation in forms observed, the identity of this organism with previously described fusiform bacilli is somewhat questionable. His organism apparently formed true spores and was an anaërobe.

I could only find two reports of the occurrence of fusiform bacilli in the eye or adnexa. Bertozzi (8) obtained them in smears and cultures from an eye lost by metastatic ophthalmitis. The patient was recovering from an attack of measles. There were apparently no other metastases found. The fusiform organisms were described as Gram-negative with granules. Wakisaka (14), reporting on the bacteriology of dacryocystitis, mentions finding "bacillus fusiformis vincenti" in one case associated with bacillus influenzæ, but no further details were given in the review consulted. Ichikawa (15) suggests that the fuchsinophil bodies which he found in sections of five out of seven cases of sympathetic ophthalmia may be bacillus fusiformis, but thinks they are more probably crystals.

DISCUSSION.—It is seen that most of these infections were of the respiratory or alimentary tract, explainable by the aspiration or ingestion of inhabitants of the mouth or gums. From the frequency with which they are found in diseased gums, it is evident that fusiform bacilli are common in the mouth. The fact that Babes (9) found them on the gums of a large number of cases of scurvy makes it probable that they are normal inhabitants of many mouths and that they may take advantage of conditions of lowered resistance or neglect of cleanliness either to produce disease or live as saprophytes on diseased tissues. That they have been found as the only organism without the presence of spirilla, in so many different lesions and in the deepest layers of the lesions, indicates that they may, under certain conditions, be pathogenic organisms of importance without the concurrence of spirilla. Whether there is only one bacillus fusiformis or several related organisms has not been definitely determined.

That fusiform bacilli are common inhabitants of the conjunctival sac is unlikely. The examination of numerous smears and cultures has never before shown any organisms suggesting to me their appearance. There is no reference to them in Axenfeld's *Bacteriology of the Eye* (11) nor in Harman's *The Conjunctiva* (12). The possibility that they may have reached the conjunctiva in these cases through the naso-lacrimal duct is made more likely by the fact that they are actively motile. But it seems at least as likely that they may enter the sac from the outside, possibly in the droplets from another person's pharynx, and find lodgment in the canaliculi or Meibomian glands.

Hearty thanks are due to Dr. J. T. Myers of the University of Nebraska for going over this material with me.

CONCLUSIONS.—1. Fusiform bacilli were found in smears from an ulcer surrounding a canaliculus in one case. They seem by their morphology and from the type of the lesion to be closely related to the bacilli of Vincent's angina.

2. Fusiform bacilli of a somewhat different type were grown in pure culture from the pus of a second case of unilateral chalaziosis. They grew aërobically and, though probably not the same organism as that of Vincent's angina, seem to belong in the group of fusiform bacilli with Babes'

organism. They produced infection of the vitreous in guinea pigs.

3. Whether they were the causative organisms in either case or only secondary invaders, cannot be definitely stated.

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THE EYE AND THE ENDOCRINE SYSTEM.[1]

By Dr. PERCY FRIDENBERG, New York.

THE biological reaction to disease and drugs that distinguishes a patient from a case, closely parallels his attitude toward life, and forms with it, personality. It is the subtle something which makes one run temperature, stand fever badly, take large doses of one drug, and be upset by minute amounts of another. Like resistance to infection, fatigue, and cold, worry and fear, it could not always be explained by stature, frame, or complexion. The recognition of such an individual factor and the need of a biological explanation appears in the earliest thought about disease and healing. To primitive man the essential ego was not cerebral, intracranial, but visceral, near the seat of life; the spirit, essence, psyche, was associated figuratively as well as literally with guts and gall, with a heart, a spleen, a kidney. The idea was incorporated in early phrase and fable, some of which has come down to our more scientific and equally searching age. Varying, in classic ages with the divinities which shaped his ends, or in medieval times with the planets which ruled their destinies, men, as well as medicines, were Jovial, Martial, Mercurial, Saturnine. Varying, later with current views or speculations as to man's spiritual and bodily make-up, philosophers, lay and medical, distinguished organic secretions or humors, producing dyscrasies, idiopathies, and special reactions to sickness, health, and the healing action of herbs, according as they were phlegmatic, sanguine, lymphatic, atrabilious, choleric. Cellular pathology discarded all this

[1] Read at meeting of the American Ophthalmological Society, June, 1920.

apparently mystic speculation, but Virchow's somewhat mechanical view of the organism as a histological specimen, was superseded by serology and enriched by its bio-chemical conceptions. To-day, again, we see a biological basis for the personality of the patient. It is, however, no longer a single humor which decides, but the balance or predominance of a number; not an organ, but an orchestra. So, of recent years, there has been an attempt to correlate the data as to the functions and biological bearing of the ductless glands, those organs of internal secretion which form the neuro-endocrine or chromaffin system. Pathological and clinical study, animal experimentation, and biological research, indicate beyond question that this system is a basic factor in structure, function, and immunity, determining skull and body form, complexion, color, stature, hair-growth and fat distribution, and emotional and spiritual trend which we sum up as race or individuality. The ophthalmological implications of this principle are interesting and worthy of study.

The division of mankind into long-skulled and short-skulled seemed to give a definite anatomical basis to ethnological categories. However, it never occurred to the anthropologists to ask themselves why skulls differ and what caused them to differ. The influence of skull and particularly orbit form on the structure and refraction of the eye was summed up in the theories of Stilling and others, but the racial differences were accepted without question as to the biologic factors involved.

Endocrinology shows us that the main factor is the predominance of the thyroid or of the pituitary. The pituitary type is characterized by a broad short skull and proportionately broad face, separated incisors, broadly spaced, deep-seated and small eyes which lack brilliance and vivacity, and have rather small pupils. The brows are heavy, the glabella broad and flat, the nose, broad with large, wide nostrils. Such a skull has large accessory sinuses, roomy sella turcica and orbits, large optic canals and foramina. The hair is coarse and sparse, the skin sallow, harsh, dry, brown, and of poor texture.

In myœdema this relative hypo-thyroid condition is accentuated and becomes physiognomic, presenting a small, recessed eye, whose lack of animation is due to a small pupil, slow ocular movements, and partly closed lids. The development of the

cranium in the neighborhood of the sella turcica and of the orbit is affected in steeple skull, associated generally with optic atrophy, and in these cases endocrine stigmata of acromegaly are not lacking. These pituitary types are also gonadal, adrenal; they lead, quiet, unruffled, contemplative lives, moving slowly but persisting in one line of endeavor, they sleep much, are sluggish, lazy, constipated, and live long. Hands and feet tend to spatulate form. The type is marked in such races as the negro, the Chinese, Polynesians, and Mongols. The hyper-thyroidic eye is sympathetico-tonic, exophthalmic, mydriatic, wide-eyed, hyperæmic, alert, sparkling, tending to red lips, conjunctival hyperæmias, epiphora, and fleeting palpebral œdemas. The expression is that of excitement, or when extreme, of fright, as seen pathologically in the clinical picture of Graves's disease. These types are temperamental, high-strung, emotional, artistic, unbalanced, live at high pressure, and consume themselves. They have a high basal metabolism, rapid heart action and respiration, flush easily. There is over-activation in every sphere. These are the dreamers, the poets, the artists, the feminine sensitive types, changeable in spirit and vocation, moody, inspired at times, witty, imaginative. They are the rhapsodists, never the judges or statisticians. They supply the contingent of the neurotics, the speech-defectives, the visionaries and cranks. They react quickly to all medicinal and morbid stimuli, tend to active inflammatory conditions, high fever, and definite symptoms. They have a quick acting gastro-intestinal tract, tend to nausea and diarrhœa, and are poor sailors; get rattled and panic stricken, lose their nerve on slight provocation, and make poor soldiers. Generally dolichocephalic, narrow-faced, narrow or olive eyed, with narrow high bridged nose, arched slender eyebrows, thin in the outer third, myopic, tending to bookishness. They have fine skins and hair, high color, turn gray early, are prone to baldness at an early age, and lose their lashes when young. Types, Semitic. Color was always looked on as a criterion of race; but here again ethnology accepted the red, the yellow, the white, and did not ask why and how these skin differences were caused. Something more than meteorological or climatic effects are needed to explain the geographic distribution of the races, either in frigid or torrid

zones. Color referred, preëminently to skin, hair, and iris; blonde meant blue-eyed and golden haired.

Here, one thinks of the important role of pigment in the ocular tissues, particularly uvea and retina, the dissociation of pigment in the chemical reaction to light in visual stimuli. Pigment production, distribution, and fluctuation in health and disease is controlled largely by the adrenals. The plus or minus in an individual is an index of his adrenals, and to a certain extent of his disease habitus or susceptibility. Such conditions as albinism or, again, of retinitis pigmentosa, must have their adrenal explanation. Pigment develops under the influence of light, the source of all energy, and may be noted in all deposits or storage of force, as in coal, chlorophyll, iron, and blood. It is never destroyed, however transported and rearranged, as in freckles, melanomata, choroiditic patches. The relation of pigment to vital energy is suggested by the difference in resistance, the susceptibility of fair, delicate, lymphatic, blonde races to tuberculosis, and the hairy growth, thick brows, and heavy beards of swarthy brunette Hindus and Latins. Degenerative changes in the skin attending senility, chronic disease (diabetes, attenuated syphilis, malaria), or disturbances of metabolism, are of endocrine, generally hypo-adrenal origin. One thinks of the age incidence of xanthelasma, notably about the lids, and its frequent occurrence in diabetics; the appearance of xeroderma pigmentosum under the influence of the syphilitic virus. The retina bears out an analogy to the skin, in its ectodermal origin, and important pigment layer. Anomalies from syphilis are found in this tissue, retinitis pigmentosa, probably too in the hemeralopia of wasting disease, vitamine deficiency, and various toxæmias. Albinism, again, with its striking endocrine stigmata, is suggestive, as is the tendency to loss of eyebrows and lashes.

Age and sex, development of form and of function, are largely controlled by the endocrines, whose balance and interrelations vary with the biologic needs of the organism in puberty, adolescence, pregnancy, lactation, and the climacteric of both sexes. Each period has its distinctive endocrine dominance which may have pathological implications in regard to the eye. Thus, the relapsing intraocular hemorrhages of adolescence, male and female, ascribed to an occult tubercu-

losis which the tests generally fail to reveal, is explainable on the basis of the predominance of the thyroid at puberty, and its activating influence on the vascular system. The vicarious menstruation of an earlier medical epoch is similarly interpreted. At the other end of life the relative hyper-thyroidism associated with the dying down of internal secretion, ovarian or gonadal, is responsible for various neuro-vascular syndromes, which were formerly summed up as neurotic. The obstinate epiphoras, hyperæmias, and occasional fleeting œdemas are characteristic of this period. Headache is often an endocrine disturbance, and while the importance of ametropia, muscle imbalance, and accommodative strains till holds good, the fact remains that some individuals never get headaches in spite of these factors, and others continue to suffer in spite of painstaking correction of minimal optical errors.

Emotional stress has in a vague way been associated with causes of disease. Our view of such reactions has largely changed, and they are now considered secreto-genic, biologically, while originating, it is true in impulses derived from sensory stimuli, and pro tanto, psycho- or neuro-genic. Hate, fear, anger, desire, are diffuse somatic ractions of a neuro-vascular type affecting the vegetative even more than the volitional spheres, and not infrequently remaining below the threshold of consciousness. At this level they are, however, tremendously active, and affect the basic processes of circulation, respiration, and digestion, and, indirectly, growth, resistance to fatigue, cold, and hunger, and probably such reactions as immunity, anaphylaxis, and phagocytosis. The internal secretions are poured into the circulation automatically under the stress of elemental urges such as hunger, desire, rage, fear, cold, and pain. What we call emotion is that part of the reaction which rises into consciousness and presides over activation of the skeletal muscles via the cranial nerves. Both reactions are purposive and eventually adaptive processes, as they represent the race memories of definite, repeated experiences and the appropriate response. The largely neuro-vascular reactions, changes in pulse rate, blood pressure, respiration, nerve and muscle tonus, as well as certain inhibitions of temporarily useless functions, are all in the interest of protection, defensive or offensive. Every emotion is a battle-

cry or a call for help; every reaction, a message of aid or of distress. Each emergency calls for an endocrine supply, and the end reaction depends on the amount of available internal secretion, notably of adrenalin. Pleasure is the elemental recognition of endocrine reserve; pain and apprehension that of weakness due to a lack. Rage is the memory of fighting and killing; fear the memory of flight; and fainting, that of escape by feigning death. But rage, endocrinologically, like lust, is the flooding of the organism with adrenalin to prepare for action; fear, the state of relative hyper-thyroidism due to adrenal deficiency. The ocular implications are interesting, particularly when we consider the pupil as an index of emotion and of cardiac action, and the rôle of the eye in expression. We can understand how fear and worry predispose to the angio-neurotic œdema, the exudation with plus tension, and the acidosis with pain, nausea, and vomiting, that we see in the acute attack of glaucoma in a susceptible race, the Semitic, at a predisposed time of middle life when adrenalin is beginning to run low, and at times determined by cold, hunger, or fatigue. Each of these factors implies a lack of adrenal or a relative hyper-thyroidism, inherited, acquired, or developing under stress. Repeated drains on the adrenal as by worry, fear, hunger, produce a more or less permanent dys-thyroid imbalance as in neuroses. The pupil, like the heart muscle, is under double nerve control, and responds to all basic neuro-vascular stimuli. The oculo-cardiac reflex of Aschner, and the effect of pressure upon the globe in slowing or speeding up the heart rate, indicate in a given case the predominance of vago-tonic or sympathetico-tonic system. A large part of our automatic defense reactions depend on visual stimuli, or as Crile says, our activation patterns come from sight. This, and the complex neural and cerebral connections of the organ of vision, may explain the comparatively severe shock produced by ophthalmic injuries and operations. The closest connection is with the sympathetic system, and this presides, as we know, over systemic prostration and recovery. The fullness and comparative hyperæmia of lids, conjunctiva, and orbital tissues not only influences expression and normal processes, but is significant in disease, while the vascular reactions of the iris and ciliary body are markedly dependent on visceral

sympathetic control. This control is not neural in the old sense, but depends on internal secretions acting practically as alkaloids. It is significant that both agents fall naturally into two large groups, activators and depressors, respectively, of the sympathetic, or vice versa as to the vagus, with a corresponding action on the pupil, according as they are meiotic or mydriatic. The pupillomotor action of a drug was always taken as an index of its systemic action and, almost, of its chemistry. We must bear in mind that these eye-drops have reactions, secondary perhaps from the standpoint of ophthalmic therapeutics, on the endocrine system, particularly the thyroid and adrenals, and, again, are aided or counter-acted by the balance of internal secretions, already present or administered therapeutically, or indirectly altered by appropriate diet, hygiene, and climate.

Seasonal Incidence.—Such factors as prolonged cold, overcrowding, lack of fresh food, defective ventilation, explain many diseases and their prevalence at certain times. It is known that all these factors act very largely through deficiency in the endocrine system which has, itself, a seasonal ebb and flow, depending partly on climate and heat, and partly on the fluctuating needs of the organism. This like all periodicity, such as menstruation, pregnancy, hibernation, is controlled by the pituitary. The prevalence in warm weather of Saemisch's catarrh cannot be explained by purely hygienic factors. The basic process, that of a lymphoid hypertrophy, associates it in our mind with adenoids, Mikulicz's disease, and Parinaud's conjunctivitis. The eosinophilia of these affections is not the only manifestation of thyroid imbalance.

Glaucoma.—The refraction and form of the eye, topography of filtration angle, cardio-vascular pressure, the plus of ciliary secretion, do not explain, although they may account for, the increase of intraocular tension. The constitutional symptoms of headache, extreme pain and prostration, nausea are significant. Pain alone, however severe, never presents this picture of endocrine storm in other eye affections. The sudden incidence from the instillation of a drop of cocaine, emotional stress, from the shock of a trifling eye injury, again point to a sympathetic irritation. Our sovereign remedies, called meiotics, depress the sympathetic and allay this irritation. Heat,

hot coffee, rest in bed, morphine, allay pain and restore the adrenaline output, thus neutralizing the thyroid overaction. The mechano-physical theory fails to explain how intra-tumors can attain large size without altering tension, and how the pupil becomes dilated and unresponsive to local meiotics while it will contract on internal administration of pilocarpin or jaborandi. We cannot fully explain why eserin fails to contract a glaucoma pupil while acting promptly on a normal iris. If plus tension alone paralyzes the sphincter, we cannot understand how the drug systemically absorbed can stimulate this muscle. Ocular angio-neurotic œdema is at times associated with glaucoma. Of his case Barkan says: "It seems too much to suppose in view of the well recognized causes of certain classes of glaucoma that all these causes should only be favoring factors to the localized œdema which raises the ocular tension. Are hyperopia, old age, stiffening of the sclerotic, disproportionate increase of lens volume, fibrosis of the ligamentum pectinatum, high blood pressure, arteriosclerosis, and sudden mental excitement, all only secondary to a local acidosis, or only an aid in its appearance? For acidosis is common in childhood, glaucoma rare; there is no œdema in diabetes, typically acidotic as it is. On the contrary, one finds hypotony in this non-œdematous highly acid state. Finally, the prompt action of meiotics especially in the case reported of angio-neurotic œdema with glaucoma is hard to reconcile with the hydrophilic theory." These considerations lead straight back to the endocrine theory. First, the various histological changes predisposing to plus tension are due to the continued effect of adrenalin on the tissues, particularly of the vessel walls. Alcohol, tea, tobacco, as well as worry and overwork, and probably specific disease, act not directly, but through this endocrine medium. There is no tendency to œdema in diabetes because this is a typically pituitary disturbance with lowered metabolism. The infrequency of glaucoma in acidotic childhood is logical in view of the untouched adrenal reserve, and the infrequency and short duration of such emotional factors as tend in the long run to produce hyper-thyroidism and the glaucoma habitus. The prompt action of meiotics might be interpreted as merely symptomatic, indicating by the pupillary reaction that the underlying paralysis of the vagus had been restored,

and the over acting sympathetic toned down. Glaucoma may be looked upon as an exudative process or œdema due to the sympathetic irritation of thyroid activation, as indicated by hyperhidrosis, tachycardia, nausea, susceptibility to atropin and adrenalin, or the provocative instillation of a mydriatic. It favors a hyper-thyroid race, the Hebrew, which is markedly predisposed to neuroses and diabetes caused largely by endocrine, formerly nervous, upset due, in part, to long continued emotional strain. It occurs at an age of relative hypadrenal-gonad secretion, the climacteric, male or female, and with emotional states of worry, fear, hunger, and exhaustion, which are notably connected with thyroid excess. Exophthalmic goitre has absolutely parallel ætiological implications and might well be looked upon as an alternative to glaucoma from the endocrine standpoint.

The rôle of skin affections and of gastro-intestinal disturbances is borne out by their endocrine control. In many diseases of the lids and conjunctiva we see a resemblance to eczema or urticaria, while gastro-intestinal intoxication is held as a common cause of uveitis and other eye disease. The skin is a mirror of the endocrine system, and constipation and intestinal torpor is often a purely dys-thyroid manifestation.

Metabolism.—The chemical products of fatigue as well as the endocrine secretion (thyroidin) which accompanies it, produce a salt retention which is neutralized by sweating, urination, and compensatory intake of fluids. This is completely analogous to the action of pilocarpine.

Acid retention with œdemas such as urticaria, or exudative process in mucous membranes is undoubtedly endocrine.

Ocular Neoplasma.—The age incidence is parallel with the pigment development of pre-senility and the biological period at which, body growth having terminated, and the reproductive call on gonad-adrenal secretion subsided, the potential energy of the endocrine system is diverted into an abnormal channel that of cell activation. All growth, or trophic dimensional increase, and development, or structural change to meet the needs of function, is controlled by the internal secretions, both in health and disease. In the eye, an embryological expansion of the brain, this double control must be significant. Crile says that the importance of the internal secretion of an organ

may be estimated by the closeness of its relation to the sympathetic system. There is a certain metaphysical, if not clinical, sanction in considering the eye, itself, as an endocrine structure, with vagus and sympathetic control, and two obligate hormones or internal secretions, the aqueous and the vitreous. Even its external secretion, that of the tears, is largely dependent on emotional, hence endocrine, stimuli.

The endocrine may account for some congenital developmental defects. Growth, development, vital rhythm, and periodicity are all dependent on endocrines, notably the adrenal and pituitary. Further study may show a factor of this sort in lamellar cataract, and those forms of lenticular opacity developing with deficiency diseases (pellagra) or nervous disturbances (tetany). The family element and factor of consanguinity in many types of hereditary ocular degeneration may be due to summation of endocrines with the production of a pathological type. In this relation we think of Mongoloid cretinism, amaurotic family idocy, chondrodystrophia fetalis, congenital ptosis and enophthalmus, buphthalmos, the blue scleræ associated with congenital fragilitas ossium, congenital corneal dystrophies.

Congenital epicanthus occurs normally among Chinese and allied races, and as an endocrine stigma of hypo-thyroidism in infants of Aryan origin. The chorioretinal degenerations associated with inherited specific disease are doubtless dependent in the last analysis on grave disturbances of endocrine balance as, are the changes in teeth, skin, and internal ear.

Endocrinology in no way supplants, it largely supplements, our views of pathogenesis and ætiology. Organotherapy is not a panacea, nor, primarily a principle of treating symptoms. It is rather in pre-pathological states, in disturbances of normal function, in the presence of syndromes indicating enodocrine imbalance, in many minor ailments, idosyncrasies, and disease tendencies, that judiciously administered extracts of combined glands may reëstablish a balance. The field is wide and undoubtedly contains much that is interesting and important for ophthalmic science and ophthalmic practice.

MEDICAL-SOCIAL SERVICE AND FOLLOW-UP WORK IN THE EYE HOSPITAL.[1]

By Dr. GEORGE S. DERBY, Boston.

IT will be admitted by all that no hospital at the present day which serves the people can give really efficient service unless it makes provision for social service work and establishes some sort of follow-up system. The importance of this subject, and the infrequency with which it is discussed at our meetings, form the justification for this paper. Probably a large part or all of what I am about to say is familiar to most of you here, but in spite of that I wish to outline briefly the status of medical-social service and follow-up work at the Massachusetts Charitable Eye and Ear Infirmary, and to invite your criticism and suggestions.

I need not go into the history of this department, except to say that it was started in 1907 with one worker and was financed by charitable persons outside the hospital, until in 1909 it was taken over by the hospital. A certain amount of follow-up work was being done by the Social Service, but no organized effort had been made along this line until 1916, and this was interrupted by the war. In 1919, a follow-up worker was installed at the infirmary as a separate line of effort, and a year later she was placed under the Social Service Department in order to avoid the overlapping which inevitably occurred. I may say also that, as yet, our Social Service Department has not recovered from the contraction due to the war and to the loss by the hospital of an annual State appropriation of $45,000.

I will pass over the routine social service work which is done in every hospital such as the investigation, help, and placing of

[1]Read at meeting of the American Ophthalmological Society, June, 1920.

cases which come into the hospital from day to day, and its action as a means of contact between the hospital and the many charitable and other agencies which exist in every community. This work takes much of the time and is the daily routine of social service, and we accept it now as a matter of course.

As the work developed it became evident that we could not burden the Social Service or Follow-up with every case which was admitted, and more and more we came to divide the material into certain groups.

From the standpoint of follow-up work, I think the most important group is formed by the acute cases, in which sight may be lost speedily unless provision is made for effective and continuous treatment. I refer especially to the severe corneal ulcerations, the acute cases of iritis, and to the injuries of the eye. All these cases should be admitted to the hospital, but there may be no bed or there may be an unwillingness on the part of the patient. Even if a patient refuses to enter, I do not think it is right for us to wash our hands of him and trust to luck that he will return to continue his treatment or will go elsewhere. We do not have this trouble often with the injury cases; but with the others and when they refuse to enter, we register them on our follow-up list and take measures to induce them to return. Such measures are usually successful. At least, we can get them into other medical hands. It is certainly contrary to sound economic policy to abandon them.

From the standpoint of saving sight, one of the most important, if not the most important, group of cases we have to deal with is formed by the non-congestive glaucomas. The congestive glaucoma case will ordinarily return of his own volition. I regret to say that I have seen a not inconsiderable number of hospital cases that have gone practically blind because they have either been ignorant or were discouraged with the apparent lack of benefit from treatment. It comes down to the fact that unless you have the means of reaching patients and getting them back, practically no glaucoma cases should be trusted on miotic treatment, and this works a very considerable hardship on these cases where miotics are indicated. Under our present arrangement, glaucomas are calendared for certain dates and are brought back with certainty.

If on miotic treatment, they are seen frequently and until the doctor in charge is satisfied that they understand the technique of using the drops and are sufficiently impressed with the importance to themselves. They are then put on the regular schedule of visits every three months. We find that once the hospital patient realizes that a personal interest is being taken in his case it is comparatively easy to get him back.

The next group is the tubercular one, and in this I should like to include phlyctenular disease. The class for ocular tuberculosis which was carried on at our hospital for nine years has been described elsewhere and needs no comment, except to say that in my humble opinion it still forms the best method of handling this very resistant and stubborn disease. Unfortunately, our class was interrupted by the war and has not yet been reëstablished, but it will be when funds allow. These patients form a relatively small group and require intensive work, especially in the homes. The phlyctenular group presents a somewhat similar, but less acute, problem. It is not improbable that these cases also might best be treated in classes. This is the material that best illustrates the value of social work. At present, all our phlyctenular cases are automatically referred to the Social Service Department. It is the duty of that Department to follow these cases through. They are given examinations of the nose and throat, teeth, and a general physical as a routine, and the home is investigated. In view of all the information obtained, the future method of handling each case is decided upon. As has been pointed out before, the phlyctenular child often means a case of open tuberculosis in the home, and, as such, is of importance to the community.

The interstitial keratitis group pays the social worker a large dividend. A full time worker is wholly occupied by these cases in our hospital. They are also referred to the Social Service by virtue of the diagnosis and are examined in much the same way as is the phlyctenular group. Once the diagnosis is made, however, their general treatment is carried out in the syphilis clinic of the Massachusetts General Hospital, and finally, when their eyes no longer need attention, they are turned over to this clinic for continued treatment. This group again is of public health importance, and great pains are taken

to bring in and to investigate the condition of the parents and other children. A study of some of these cases was presented at the American Medical Association meeting in 1917. At present we have about seventy active cases under treatment.

Another important group is represented by the cases of ophthalmia neonatorum. Without the social worker we should be at a loss in handling them. Many of these babies require breast milk if they are to live. This may often be obtained from the mother or elsewhere, so that it is important to establish contact with the home at once. Perhaps the case shows neglect—it is for the social worker to find where the fault lies, that it may be presented to the proper authorities. In the gonorrheal cases, the disease is present in the mother and often in the father, and they must be brought to the hospital and treated. For the benefit of future babies, they must be told plainly the nature of the disease they suffer from and what its consequences are, and a great deal of valuable work can be done along the line of preparing the home for the return of the baby. All this work should be done by other agencies than ours, but, as yet, the public health authorities have been unwilling to undertake it.

The last group I propose to touch is the myopic one. Prevention is better than cure. We see a not inconsiderable number of cases each year that have become industrially unfit through increasing myopia. We have started to check up our myopes each year, and expect to institute measures of control in those cases where progress is alarmingly rapid.

As a matter of survey, the Department has undertaken to tabulate for a year the industrial accidents which pass through the clinic or are entered directly to the wards from the scene of injury. During the past seven and one half months 154 such cases have been admitted. The findings of the entire year may show something worth while, and the Department hopes to be able to work out the problem in conjunction with the Massachusetts Industrial Accident Board.

More and more, as time goes on, does the work take on a public health phase, and on this account it has been thought best to attach to the Department at least one worker who has an intimate knowledge of the entire workings of health departments and public and private health agencies in the State.

The work is wholly an educational one, which cannot be carried out by the Department alone, but, in its far-reaching aspect, is a coöperative one and can be done only by the close interrelation of outside and inside agencies.

One phase of follow-up has not been touched, which is the routine return of selected cases each year so that the final results of operation and treatment may be learned. This seems to me to be of the greatest importance for every hospital.

This, in brief, covers the principal lines along which we are working at present, and it should be emphasized again that this paper has not touched routine social service work, which must form a very large part of the activity in every hospital.

UVEITIS DEPENDENT UPON FOCAL INFECTION IN THE APPENDIX.[1]

By Dr. HUNTER H. McGUIRE, Winchester, Va.

THE experience of the past ten years in the treatment of inflammatory affections of the uveal tract has proven very conclusively that the septic or toxic origin of uveitis may now be regarded as an established fact. In 1907, Sidney Stephenson (1) asserted that "most probably every case of uveitis is of septic or toxic origin," and de Schweinitz, in a most exhaustive study of chronic uveitis, expressed the same opinion in a paper read before the International Congress of Medicine in 1913. In more recent years, other observers, concurring in the views so fully elaborated by de Schweinitz, have given weight to the evidence submitted by earlier investigators and have reported case histories to substantiate their claims.

The intimate relationship between focal infection and diseases of the uvea has possibly received as much, if not more, consideration in the literature than any other one subject in ophthalmology. Illuminating articles with striking examples of the influence of septic processes in the production of uveitis are frequently appearing in the journals and are stimulating further activity in the study of this very interesting relationship.

To a large extent the literature, to the present time, has concerned itself particularly with those changes in the uveal tissue resulting from focal infection in the teeth, tonsils, nasal accessory sinuses, and to certain auto-intoxications originating from putrefactive processes in the gastro-intestinal tract.

Excluding the syphilitic, tuberculous, and sympathetic

[1]Read at meeting of the American Ophthalmological Society, June, 1920.

types and those due to focal infection in the regions mentioned, little attention has been paid to the influence of septic foci in more remote parts of the body.

The conclusions to be drawn are that either these cases are comparatively rare or that this source of infection is sometimes overlooked.

If, however, we accept the theory of circulating bacteria or their toxins in the blood, if we admit, with Rosenow (2), that bacteria of a focal infection may attain a specific pathogenic and elective tissue affinity, and if it is true, as maintained by Sidney Stephenson and others, that the ciliary body is engaged in the excretion of poisonous substances, is it unreasonable to assume that uveitis may result almost as readily from focal infection in distant organs as from such infections in neighboring structures?

This communication is concerned only with uveitis dependent upon focal infection in the vermiform appendix.

In a somewhat hurried review of the American literature I have been unable to find many references to this source of infection. Indeed, where casual mention has been made of the diseased appendix as an ætiologic factor, the term chronic appendicitis has been usually employed and acute suppurative appendicitis has not, as far as I can learn, been referred to as an exciting cause of inflammatory affections of the uveal tract.

While it is sometimes extremely difficult to draw a sharp distinction between the several types of appendicitis, inasmuch as all are due to bacterial infection, it may be said that the various types are dependent upon differences in degree of the virulence of the infection, and one may, at any time during the progress of the disease, take on the clinical aspects of the other. Thus the chronic type may rapidly pass on to the acute suppurative form and the latter frequently assumes the clinical characteristics of the acute fulminating variety.

As is well known, chronic appendicitis may exist for months or years without causing many symptoms in the region of the appendix and yet manifest itself by a slowly developing toxæmia which may, in turn, cause chronic digestive disturbances or secondary inflammatory changes in other structures. It is, probably, by reason of this fact, therefore, that the few

cases of uveitis referred to in the literature as the result of infection in the appendix are said to be attributed to the chronic form of the disease.

As an illustration of its influence may be mentioned the case referred to by de Schweinitz in his article, "The Pathogenesis of Chronic Uveitis," (3) and I take the liberty of quoting the author's account and comment upon this case history:

"Chronic appendicitis, among other abdominal infections, has been made responsible for relapsing uveitis. A case in point is the following: Relapsing iridocyclitis (uveitis) apparently due to chronic appendicitis. Communicated by Dr. B. F. Baer, Jr. A man, age not given, following an attack of acute appendicitis, developed left iridocyclitis, with the gradual formation of total synechia and vitreous opacities. The patient has suffered from frequent attacks of mild appendicitis and with each attack the ocular inflammation has been relighted. In place of iritis, at other times, he has had mild attacks of pleurisy and inflammation of various joints. These have alternated apparently with the ocular inflammation. Negative t. b. tests; Wassermann not applied, but no family or personal history justifies the suspicion of syphilis. Excellent results have always followed strict regulation of the diet, calomel catharsis, and the use of salts.

"The interesting point in this case is that apparently the infection sometimes attacks the uveal tract, sometimes the pleura, and sometimes the serous membranes of the joints, and it would seem to be a good instance of the possibility of a focus of distant infection being the ætiologic factor in uveitis. Unfortunately, there is no account of the condition of the teeth or tonsils."

J. E. Reeder (4), in 1917, reported the case history of a woman, aged 28, who developed a double iritis and who gave a history of having had several attacks of appendicitis extending over a period of eighteen months. The iritis was at first attributed to an infected tooth, the extraction of which failed to arrest the progress of the disease. There was no specific history and apparently no reason for subjecting the patient to the Wassermann test. Under rest, free elimination, sodium salicylate, and the usual local measures, the inflammation gradually subsided. In the course of a month a fresh attack of

iritis developed and coincident with this the patient had an acute attack of appendicitis. Operation was advised and an appendectomy promptly done. At the end of ten days the iritis had subsided and two years later no recurrence had been recorded.

The interesting feature of this case lies in the fact that the patient had been subject to what were apparently attacks of chronic appendicitis for a period of eighteen months and not until the condition became acute were there any signs of involvement in the eyes. In other words, a sudden increase in the virulency of the infection in the appendix appears to have been the exciting cause of the ocular lesion.

The case I wish to record presented some rather interesting features and inasmuch as I was able to follow it to its conclusion, I think its problems are worthy of consideration.

The patient, a girl of sixteen, consulted me during the early part of 1918. A week previous to her visit she waked one morning to find the vision of the right eye very much impaired and at once consulted her family physician. A tentative diagnosis of iritis was made and atropine with hot compresses prescribed. As the condition grew rapidly worse she was referred to me. The eye showed marked ciliary congestion, pupil semi-dilated, numerous deposits in Descemet's membrane, and a densely infiltrated vitreous. On account of the density of the media no view of the eye-ground was obtainable. The iris, partially under the influence of atropine, showed distinct evidences of involvement. The tension was high and vision reduced to light perception. The whole picture was typically characteristic of those very acute types of uveitis we sometimes encounter.

The general and personal history of the patient, at the time of her first visit, gave no clue whatever as to the origin of the inflammatory condition of the eye. Her physical build and general characteristics were rather suggestive of the tuberculous type, though there was no history to indicate that such was the case.

In the hope of locating the source of the infection she was subjected to the usual diagnostic tests. The Wassermann and the tuberculin reactions were negative, X-ray pictures of the sinuses and teeth showed no signs of involvement, the tonsils and thyroid glands were normal, and the urinary secretions and stools were unaffected. There were no physical signs of pelvic disease and no history of menstrual irregularity.

The eye continued to grow worse despite the fact that both the usual local and constitutional measures were continued over an extended period.

After two months of entirely ineffectual treatment, the patient, on the occasion of one of her visits, for the first time gave me the very interesting information that on the night her vision became impaired she had suffered from rather a sharp attack of pain in the right iliac region. She further stated that during the two months the eye had been under observation, she had experienced several attacks of pain in the right side of the abdomen. Her description of these attacks indicated that they were comparatively mild and of short duration. In fact the pain had not been sufficient to need an opiate or to call a doctor, and under the influence of rest in bed and elimination, promptly subsided.

Because of this history and in view of the fact that other sources of infection had been eliminated, it was deemed advisable to consider the appendix as a possible factor in the case and the patient was again subjected to a thorough physical examination. A diagnosis of chronic appendicitis was made and operation urged. After much persuasion on the part of her physician and myself she reluctantly consented to an appendectomy. The hospital record of the operation recited that the appendix was filled with pus and was almost ready to perforate. Unfortunately the importance of making a culture in this case was overlooked and the type of the infection was, therefore, not recorded.

The patient was seen by me a few days after operation and volunteered the information that there had already been a marked improvement in her vision. From this time on careful observations were made every few days and each examination gave evidence that the inflammatory process was rapidly subsiding. In six weeks the vision was normal and all evidences of inflammation had disappeared.

I had an opportunity to examine this patient eighteen months after operation and during that period there had been no recurrence of the ocular inflammation and the eye-ground was entirely free from secondary changes.

The point which this case seems to emphasize above all others, is the importance not only of a thorough and painstaking physical examination in all cases of uveal tract disease, but the absolute necessity of obtaining from the patient such facts regarding the general and personal history as will enable us to comprehensively study the case and make logical deductions as to their influence.

If, in this case, I had been able to elicit from the patient the very definite history of trouble in the right iliac region, which developed coincidently with the ocular inflammation, at an earlier period, the problem would have been simplified and the patient's life and vision would not have been jeopardized. I think it behooves us, as ophthalmologists, to adopt the same methodical and exhaustive methods in taking our case histories as are being practiced by our friends in internal medicine, and I am glad to note that emphasis is being laid upon this point by many of our most distinguished teachers. As Duane (5) very tersely puts it, "The student should be taught to make an examination that is absolutely systematic, thorough, and complete, so that whatever else may be his deficiencies, he shall not miss any diagnostic point from failure to look for it, or miss any symptom from failure to ask about it."

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RESULTS OBTAINED WITH MÜLLER'S RESECTION OF THE SCLERA IN DETACHMENT OF THE RETINA DUE TO HIGH MYOPIA.[1]

By Dr. E. TÖRÖK, New York.

THE cause as well as the treatment of detachment of the retina in high myopia has long been the subject of lively discussion in medical literature. It must be admitted, however, that both cause and treatment are still unknown, although various more or less acceptable and logical theories have been advanced on this subject from time to time.

The theory which appealed to me most, from the standpoint of cause as well as cure, is the one advanced by Müller in 1903. Müller explained the detachment of high myopia by the enlargement of the globe, a fact which is well known and can be positively ascertained by actual measurements of the eyeball. He says that the enlarged globe causes a stretching of the choroid, thereby interfering with the circulation of the blood therein. This interference with the blood circulation causes the atrophic changes in the choroid and if it increases beyond a certain point a transudate forms between the choroid and the sclera, and also between the choroid and the retina, producing a detachment. According to this theory, therefore, a detachment of the retina is always associated with a detachment of the choroid, the latter always being of a much less degree than the former, because there is a more or less firm attachment of the choroid to the sclera while there is no attachment between the retina and the choroid.

The presence of a yellowish fluid in the suprachoroidal space can easily be demonstrated in every case of detachment

[1] Read at meeting of the American Ophthalmological Society, June, 1920.

of the retina. When performing a Müller's resection at the moment the sclera is penetrated this fluid can be seen to ooze out through the opening.

This theory would explain not only the presence of a detachment, but also the various other atrophic changes in the fundus of a high myope.

If we accept this theory it is logical that the only remedy for these cases is the relieving of the tension of the choroid, thereby improving its blood circulation. Müller attempted this by actually decreasing the size of the eyeball in excising a piece of the sclera.

I performed this operation the first time in 1912 and had the pleasure of reporting about some of these cases before this Society in May, 1917, up to which time I had performed the operation on eleven eyes. Since then ten more eyes have been operated upon by this method, so that the total number, at present, amounts to twenty-one cases.

As I stated in my paper of 1917, the first six cases must be excluded as they were failures on account of lack of technic, therefore it would be unfair to the history of the operation to draw any conclusions as to the merit of the procedure while including these. The short history of the remaining fifteen cases is as follows:

L. M. Woman, 45 years of age, who lost one eye from detachment of retina due to high myopia, came to the Knapp Memorial Eye Hospital in July, 1914, with high myopia and detachment of one month's standing in the other eye. Right eye: No perception of light. Left eye: $\frac{5}{200}$. Right eye diverging. Cataract. Left eye, large detachment below and temporally and extensive myopic changes in fundus.

July 14, 1914, Müller's resection left eye.

On discharge from the hospital two weeks after the operation, no detachment present. Vision: With −8.00 D. Sph. $\frac{20}{200}$.

April, 1917, shallow detachment below, which interferes but very little with her field of vision and sight. Vision: With −8.00 D. Sph. $\frac{20}{200}$.

H. G. Male, 47 years old, right eye lost from detachment of the retina in 1909. Left eye, detachment of the retina

with extensive atrophic changes in the fundus; the detachment of five months' standing. Vision: Right eye $\frac{3}{200}$ eccentrically. Left eye: Hand motion.

October 27, 1914, Müller's resection left eye.

At discharge from the hospital there was a shallow detachment below in the extreme periphery. Vision: With glasses $\frac{20}{100}$.

January, 1915, detachment below. Vision: $\frac{10}{200}$.

April 20, 1920, same condition. Vision: $\frac{10}{200}$. Patient is walking about in the street unescorted. He came to me complaining that he was not admitted to the workshop for the blind on account of his vision and wanted to know whether or not further improvement could be had in the vision of his left eye.

Since there was a detachment in the lower portion of the eyeball on April 30, 1920, a Müller's resection was done below behind the insertion of the inferior rectus muscle. The result of this operation was a considerable improvement in the size of field of vision; however, there is still a shallow detachment present below. Vision: Remained $\frac{10}{200}$.

S. G. Male, 32 years of age. Came to the hospital on April 21, 1915, with detachment of four days' standing in his right eye. Vision: Right eye: Hand movement; left eye: $\frac{20}{200}$ with his glasses. Right eye large detachment above extending downward to almost the disk and the retina is also detached temporally and nasally. In the left eye extensive myopic changes including macula.

May 13, 1915, Müller's resection of the sclera.

On discharge from the hospital no detachment in the right eye. Vision: $\frac{20}{200}$ with glasses.

July 30, 1915, slight detachment below in the periphery. Vision: $\frac{10}{200}$.

A. D. Came under my observation in 1911 with high myopia, −24 D. in the right eye and −25 D. in the left eye.

In December, 1911, the right lens was removed and with glasses $\frac{2}{60}$ vision was obtained.

In January, 1914, the left lens was removed and the vision with glasses was $\frac{2}{60}$.

She returned to me in November, 1915, at which time she had a large detachment in the left eye, the vision being only hand motion.

December, 1915, Müller's resection of the sclera left eye.

On discharge from the hospital there was a shallow detachment below and vision was $\frac{15}{200}$.

She returned again in October, 1917, with a detachment

in the right eye. Vision: Hand motion. Müller's resection was advised for this eye also, but she could not have the operation performed on account of expecting a baby at that time, and she did not return for the operation until March, 1919, when a Müller's resection was performed on her right eye. Vision: On discharge from the hospital the sight of the right eye was only $\frac{3}{200}$ eccentrically. The fundus was not visible on account of a thick secondary cataract.

April 25, 1920, the condition of her eyes was as follows: Right: Divergent strabismus with a thick secondary cataract. Fundus not visible. Vision: $\frac{3}{200}$ eccentrically. Left eye: Detachment below. Vision: $\frac{15}{200}$. The detachment does not interfere with her daily routine work; attending to her household duties and taking care of her two children.

J. H. Male, 38 years of age. Came to me in February, 1917, with a detachment in his right eye of eight months' standing. Vision: $\frac{3}{200}$. Detachment is shallow, but extends over the entire fundus not including macula. There were also floating opacities in the vitreous. Left eye, high myopic astigmatism with fundus changes.

March 1, 1917, Müller's resection of the sclera right eye.

On discharge from the hospital there was no detachment and vision with glasses was $\frac{30}{100}$.

April 23, 1920, right eye posterior cortical cataract, opacities in vitreous and shallow detachment below and temporally. Vision: $\frac{15}{200}$.

A. F. Female, 38 years of age. Right eye high myopia with slight fundus changes. Vision: With glasses $\frac{20}{30}$. Left eye: Detachment of eight months' standing. The detachment is total including the macula. Vision: Hand movement eccentrically.

February 20, 1917, Müller's resection of the sclera left eye.

On discharge no detachment in the periphery, but a cystic detachment of the macula. Vision: $\frac{10}{200}$ eccentrically.

May, 1917, vision: $\frac{10}{200}$, small circumscribed detachments in the periphery.

April 26, 1920, vision: $\frac{6}{200}$ eccentrically. Macular detachment and also several small detachments in the periphery.

R. G. Woman, 21 years of age, came to the hospital on August 22, 1917, with a detachment of the retina of five months' standing, below and temporally, and also floating opacities in the vitreous. The left eye was normal, emme-

tropic. Vision: Right eye: Movement of hand. Left eye: $\frac{1}{10}$.

November 14, 1917, Müller's resection of the sclera right eye.

On discharge from the hospital shallow detachment below and at the macula. Vision: $\frac{6}{60}$ eccentrically.

June 4, 1918, vision: $\frac{6}{60}$ eccentrically, shallow detachment below and also detachment at the macula.

H. S. Male, 28 years of age, high myopia both eyes. Left eye, total detachment for five months. Right eye, extensive myopic changes. Vision: Right eye: $\frac{20}{100}$ with glasses. Left eye: Movement of hand eccentrically.

February 6, 1917, Müller's resection of the sclera left eye. Immediately after operation no detachment of the retina. Vision: $\frac{10}{100}$.

July, 1917, no detachment in the periphery, but macular detachment. Vision: $\frac{10}{100}$ eccentrically.

J. P. Male, 35 years of age. First seen March 20, 1918, at which time he complained of failing vision in the right eye for four weeks and in the left eye for ten weeks. Both eyes showed extensive myopic changes in the fundus, floating opacities of the vitreous, and shallow detachment below and temporally. The vision in the right as well as the left eye was $\frac{6}{60}$ with his glasses.

March 27, 1918, Müller's resection of the sclera right eye.

On discharge from the hospital, no detachment. Vision: With glasses $\frac{20}{100}$.

April 25, 1918, Müller's resection of the sclera left eye.

On discharge from the hospital, no detachment. Vision: $\frac{20}{100}$.

June, 1918, both eyes shallow detachment below. Vision: With glasses right $\frac{20}{100}$, and left $\frac{20}{100}$.

I. C. Male, 40 years of age. In June, 1918, noticed that sight of left eye suddenly became very bad. Right eye: Extensive myopic changes. Vision: With glasses $\frac{20}{100}$. Left eye: Extensive myopic changes in the fundus, with detachment of the retina below and nasally including the macula. Vision: Hand motion.

October 18, 1918, Müller's resection of the sclera left eye.

On discharge from the hospital shallow detachment below and detachment at the macular region. Vision: $\frac{6}{60}$ eccentrically.

April 23, 1920, shallow detachment below and central detachment. Vision: $\frac{6}{60}$ eccentrically.

W. M. Male, 40 years of age. First seen April 22, 1919, at which time right eye showed almost total detachment; left eye extensive choroidal changes. Vision: Right eye: Hand motion. Left eye: $\frac{20}{200}$, with glasses.

April 22, 1919, Müller's resection of the sclera right eye.

On discharge from the hospital shallow detachment below and central detachment. Vision: $\frac{1}{200}$ eccentrically.

April 23, 1920, shallow detachment below and detachment at the macula. Vision: $\frac{1}{200}$ eccentrically.

B. K. Female, 24 years of age. First seen October 4, 1919. Left eye lost from detachment of retina ten years previous, eye diverging, lens opaque. Detachment of the retina in right eye for three weeks. The eye showed a large almost total detachment; the macula not being affected. Vision: Right $\frac{5}{200}$; Left: No perception of light.

October 5 and October 11, 1919, posterior sclerotomy right eye with no result.

October 18, 1919, Müller's resection of the sclera right eye.

On discharge from the hospital shallow detachment below. Vision: $\frac{5}{200}$.

April 23, 1920, small circumscribed detachment at various places in the fundus, but macula was clear. Vision: $\frac{10}{200}$. Patient getting along splendidly, able to walk about in the streets unassisted and can do her household duties well.

B. S. First seen January 5, 1920, when right eye showed high myopia with extensive myopic changes in the fundus. Vision: With glasses $\frac{5}{10}$. Left eye: High myopia and large detachment of retina of four months' duration below; the macula was not affected. Vision: $\frac{5}{200}$.

January 7, 1920, Müller's resection of the sclera left eye.

On discharge from the hospital shallow detachment below. Vision: With glasses $\frac{20}{200}$.

May 3, 1920, shallow detachment below. Vision: With glasses $\frac{20}{200}$.

The operation was performed in all these cases as described in my former paper on this subject.[1] The patients were under observation from three months to five and one half years. The detachment was present in the various cases from a few days to two years. In no case did I obtain a permanent total reattachment as reported by others, but I found that all cases showed a great deal of improvement immediately after the

[1] Archives of Ophthalmology, Vol. xlvi., No. 5, 1917.

operation, at which time the fundus in the greater number of cases showed no detachment. A month or two afterwards a certain amount of detachment usually returned. This detachment as a rule was small and shallow and was situated in the extreme periphery in the lower portion of the eyeball, affecting the patient's sight but very little. This detachment was usually stationary, no advance, or very little, having been observed in my cases, so that it may be said that the vision the patient had about two or three months after the operation was more or less permanent. The return of a certain amount of detachment may be due to the fact that after the operation was performed it probably took some time for the circulation in the choroid to reëstablish itself after the tension upon the blood vessels had been relieved. This may account for the return of some of the detachment. However, after the circulation had been reëstablished the detachment did not advance any further.

The best results have been obtained in cases where the operation was performed within a few weeks after the development of the detachment. In these cases when the choroid is punctured and the fluid is evacuated the immediate result is usually a complete reattachment and later a shallow detachment develops below in the extreme periphery.

Cases where the detachment is several months old are less favorable. It seems to me that in these cases certain parts of the detached retina become walled off, so that no complete reattachment can be obtained even immediately after the operation. Usually several small cystic detachments can be seen in various parts of the fundus, which are more or less stationary.

Cases of total detachment where the macular region is also involved are most unfavorable. I found in all of my cases that the macular detachment remains as a rather circumscribed cystic detachment, causing, of course, a central scotoma, so that in these cases only eccentric vision can be expected.

It is, therefore, my opinion that in cases of detachment of the retina Müller's resection should be performed as soon as possible after the diagnosis has been made. This operation should not be the last resorted to, but the first step in our treatment as it is void of all danger and if performed early promises better results than any other method hitherto practiced. Later,

if it is found necessary, it can be followed by any other surgical or medical procedure.

The only disadvantage it has is that it is highly technical, but by no means as formidable or difficult as it appears when one reads a description of it. This impression of extreme difficulty and danger to the eye is, I believe, the reason why this really valuable operation has not become more popular with the medical profession.

There is no doubt that it is necessary to have some practice and experience before the operation can be mastered to such an extent as to obtain satisfactory results, but I believe I can safely state that anybody who can perform a cyclodialysis without puncturing the choroid will be able to master this operation after having performed it a few times. It is not such a large or dangerous operation as it appears.

The preliminary Krönlein resection as advised by Müller is absolutely superfluous as a large external canthotomy gives us plenty of space in which to work.

In my last case, performed a few weeks ago, but not included in the cases noted above, as an experiment I placed the scleral flap to be excised behind the insertion of the inferior rectus muscle and found that the operation can be performed there without the slightest difficulty. After dividing the inferior rectus muscle, with the aid of a strong suture placed in the sclera at the insertion of the muscle, the eyeball can be rotated upwards sufficiently to give space to perform the operation.

The procedure is absolutely void of any danger as far as the eye is concerned. Loss of vitreous cannot occur as the vitreous chamber is not opened, the scleral wound cannot gape, as the scleral flap is not really excised but is pushed between choroid and sclera so that even if the sutures should slip the wound will not open. The eyes always recover quickly and the reaction following the operation is very slight. I usually find a slight œdema and congestion of the bulbar conjunctiva at the site of the operation which disappears in about three or four days.

Just a few words as far as the visual results are concerned. Success in a case of detachment of the retina, of course, cannot be estimated by the vision obtained in the eye. All these cases show the degenerative changes of high myopia with

posterior staphyloma, peripapillar atrophy, macular changes, and floating opacities in the vitreous. They consequently are eyes which even before they became blind from detachment have had very poor vision, amounting at best to not more than $\frac{10}{100}$ or $\frac{10}{100}$ and usually to less. If this vision, or even a fraction of it, enough for the patient to walk about unassisted, can be saved, in a condition which otherwise in almost all cases ends in complete blindness, we may be well satisfied.

ILLUSTRATING DR. REESE'S ARTICLE ON "SUCCESSFUL REMOVAL OF THE ORBITAL PORTION OF THE OPTIC NERVE FOR A PRIMARY INTRADURAL TUMOR, WITH PRESERVATION OF THE EYEBALL AND MOTILITY, BY THE KRÖNLEIN METHOD."

FIG. 1.
Before operation.

FIG. 2.
Showing motility inward 2 months after operation.

FIG. 3.
Showing motility outward 2 months after operation.

SUCCESSFUL REMOVAL OF THE ORBITAL PORTION OF THE OPTIC NERVE FOR A PRIMARY INTRADURAL TUMOR, WITH PRESERVATION OF THE EYEBALL AND MOTILITY, BY THE KRÖNLEIN METHOD.[1]

By Dr. ROBERT G. REESE, New York, N. Y.

(With six illustrations on Text-Plates XVI. and XVII.)

Peter F., aged five, was brought to the New York Eye and Ear Infirmary in October, 1919, because of a prominence of the right eye, which had existed for two years, and followed an injury to the right side of the head. For the past five months the exophthalmos had increased rapidly.

On examination the right eye is pushed forward and downward, the motility of the eyeball is normal outward and downward, limited inward and absent upward, palpation reveals no tumor in the orbit. Hertel's exophthalmometer registered 25*mm* O. D. and 19*mm* O. S. Vision could not be tested.

The right pupil is mid-wide dilated and reacts sluggishly to light. The consensual reflex to each eye is transmitted.

The media are clear; the retinal arteries are attenuated, and the veins distended and tortuous. The disk shows a neuritic atrophy.

Examination of the nose is negative and the tonsils are hypertrophied.

There was no bruit nor pulsation, and an X-ray examination was unsatisfactory. The Wassermann and Noguchi tests were negative; the blood count was normal and hæmoglobin 90. The diagnosis of tumor of the optic nerve is made, and operation advised.

Operation, November 12, 1919.—Under ether the usual incision in the Krönlein operation along the outer margin

[1] Read at meeting of the American Ophthalmological Society, June, 1920.

of the orbit is made. The bone-flap is formed with a hand-saw and chisel, and reflected. A horizontal incision is made in the orbital periosteum, and the finger introduced encounters an enlarged optic nerve extending the entire length of the orbital portion.

An aneurysm needle armed with a suture is passed around the nerve and tumor, near the sclera, and the suture securely tied. The mass is then cut through close to the sclera, and traction on the suture draws the nerve outward between the external and inferior rectus muscles. With curved scissors it is excised at the optic foramen. There is little hemorrhage. The flap is replaced and the periosteum is sutured with catgut, and the skin incision is united with silk. At the close of the operation there was no exophthalmos, but the lids were sutured together as a precautionary measure. No drainage was used. The recovery was uneventful.

The tenth day after the operation the sutured lids were opened. The cornea was anæsthetic, and at its center there was a slight cloudiness and a depression in the epithelium with some exfoliation. The cloudiness did not extend more than 3*mm* from the center, and this area gradually cicatrized without the formation of an ulcer. The treatment consisted in the application of a bandage, borated vaseline, atropine, holocaine and dionin locally and iron, quinine, and strychnine internally.

It seems as if the neuroparalytic keratitis was due to a disturbance of nutrition produced by paralysis of a branch of the trigeminus, and not to desiccation.

June 1, 1920, nearly seven months since the operation, the right eye showed an anæsthetic cornea and a cicatrix 2 x 3*mm* just below and external to the pupillary area. The transverse diameter of the cornea was 11*mm*, the iris was lighter blue than the fellow eye, the pupil measured 6*mm* and naturally was irresponsive to light directly and consensually. Hertel's exophthalmometer registered 19*mm* at 110 for each eye. The fundus picture could not be studied from day to day but at the final examination the retinal vessels seem to be pervious, somewhat attenuated but did not pulsate on pressure, and none were transformed to white lines. The disk showed neuritic atrophy, and in the macular region there was marked chorioretinal atrophy with pigmentation. The pigmentation and atrophies which were observed are presumably evidences of disordered circulation.

The position of the eye was normal and the motility in all directions was good.

The pathologic examination made by Dr. James Ewing was as follows:

Gross Description.—The tumor measures 25*mm* in

ILLUSTRATING DR. REESE'S ARTICLE ON "SUCCESSFUL REMOVAL OF THE ORBITAL PORTION OF THE OPTIC NERVE FOR A PRIMARY INTRADURAL TUMOR, WITH PRESERVATION OF THE EYEBALL AND MOTILITY, BY THE KRÖNLEIN METHOD."

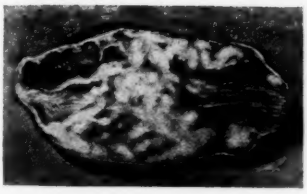

FIG. 4.
Drawing of the longitudinally bisected gross specimen.

FIG. 5.
High power magnification showing general structure of tumor.

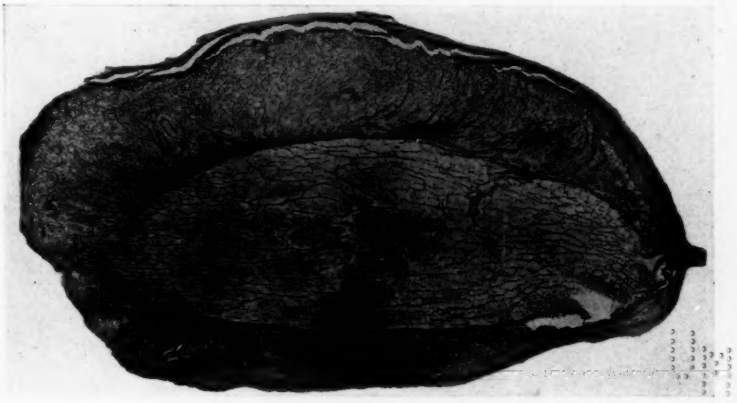

FIG. 6.
Low magnification of whole tumor, showing ensheathing of nerve trunk by tumor tissue.

length by 13*mm* in diameter. It is of elongated oval form, translucent smooth texture, soft consistence, and grayish color. It is sharply encapsulated.

Through the center of the tumor can be seen the outline of the somewhat thickened optic nerve, which is surrounded by the main mass of tumor tissue. This relation suggests that the tumor tissue is derived originally from the structures just within the capsule.

Microscopic Structure: The tumor is composed of compact masses of small cells of indistinct spindle and polyhedral form and containing small slightly vesicular nuclei. There is little stroma between these cells and little of the mucous material so commonly seen in these tumors.

The remnants of the optic nerve are extremely cellular, and in places the overcellular nerve tissue appears to merge insensibly into the tumor tissue. Near the eyeball the bundles of the nerve fibrils are partly preserved, but very cellular, behind there is greater cell overgrowth and the structure in the nerve trunk resembles that of the surrounding tumor.

The capsule of the tumor is composed of dense fibrous tissue like that of the normal dural sheath.

The blood vessels of the nerve trunk area are small, numerous, and pervious, those of the surrounding tumor are very scanty. Anteriorly there is a cross section of a rather large pervious artery.

Interpretation.—The tumor presents the essential features of a primary growth of the optic nerve structures, which may best be designated as myxoglioma. The myxomatous element is, however, not marked in this case. The partial preservation of the nerve trunk with abundant growth of a peripheral neoplasm suggests that the tumor may have arisen from some cells beneath the capsule and not from nerve elements. Yet the whole nerve shows definite and most of it shows extreme overgrowth of cells which must be derived from some cell in the original nerve tissue. The supporting glia cells seem to be the most probable point of origin. It appears likely that the tumor process began behind and gradually advanced forward, thus accounting for the ensheathing of the nerve trunk and its partial preservation near the eyeball.

Intradural tumors of the optic nerve were first described by Wishart (1883) and Byers (1), Parsons (2), Hudson (3), and others have made exhaustive studies of the literature and reported cases. The condition is essentially one of early life; it is indeed probably congenital, and only four cases of Byers's

group occurred after the twenty-fifth year. Parsons thinks that nearly all the intradural tumors are a form of fibrous growth, which he called "fibromatosis," even though they were reported under such titles as myxomata, gliomyxomata, sarcomata, and myxosarcomata. All are essentially mesoblastic in origin and are compared with elephantiasis of the subcutaneous tissue. The same author has collected accounts of 18 primary tumors originating within the nerve sheath (extraneural or intradural), as opposed to 102 instances developing in the nerve substance (intraneural).

Hudson draws attention to the fact that fifty of these optic nerve tumors are incompletely removed, and says the Krönlein operation is not essential. In my case the Krönlein osteoplastic resection of the outer bony wall of the orbit, proved perfectly satisfactory, and Knapp's (4) case, with a beautiful cosmetic result, seems to make this operative procedure the one of choice, and would certainly reduce the percentage of incomplete removal. I have witnessed two operations for the extirpation of intradural tumors of the optic nerve where the Krönlein method was not employed and in neither case was the entire orbital portion of the optic nerve removed, and the traumatism was necessarily great.

There is no recorded case of local recurrence in the orbit in spite of the fact that so many of these tumors have been incompletely removed, but it stands to reason that intracranial extension is less likely to occur if the nerve is cut through close to the optic foramen.

Schlodtmann (5) shows that the changes in the ophthalmoscopic picture of the retinal circulation depends upon whether a collateral circulation has been established or not. In the case here reported there did not seem to be any marked difference in the retinal circulation before and after the operation and yet the central retinal artery was shown to be pervious by the microscopic examination, so that the collateral circulation was post-operative and some of the posterior ciliary blood-vessels must have escaped obliteration. The tumors are generally regarded as almost benign, but Byers justly warns against this assumption, as it may be years before the intracranial extension shows itself.

De Schweinitz (6) cites a case where radium did not prove to

be effectual on the development of a recurrent growth, but it would be advisable to institute systematic treatment with the X-ray for recurrences as it seems to have a distinct effect on the growth of gliomatous tissue (7).

[The microphotographs were made at the Pathologic Laboratory of Cornell University Medical College by Mr. W. S. Dunn and the drawing of the bisected macroscopic specimen by Miss M. Freret, artist to the New York Eye and Ear Infirmary.]

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A CASE OF CAVERNOUS LYMPHANGIOMA OF THE ORBIT.

By Dr. HARRY S. GRADLE, Chicago.

THE following case is presented without discussion merely because of its rarity:

Ethel J., age 7 years. A healthy well-developed child without physical abnormality. At six months of age a small round growth appeared in the right lower lid. This has been growing slowly ever since and attained its present size somewhat less than one year ago.

The inner two thirds of the right lower lid is bulged forward by a subconjunctival mass that seems to extend posteriorly into the orbit. This portion of the lid is discolored and the covering skin is rather tense. The lacrimal punctum is closed by compression. The outer third of the lid is normal as is the upper lid. The mass lies subconjunctivally and is not moveable and has the consistency of orbital fat. The eyeball is turned upward and outward and protrudes about 2 to 3 millimeters. The motion of the eyeball downward as well as inward is limited so that binocular vision is impossible. The eyeball and the vision are normal. The left eye is normal.

The right lacrimal point was dilated and a No. 1 probe passed with comparative ease. It could be felt between the tumor mass and the nose. An X-ray of the orbit gave no further information. Tentative diagnosis, dermoid of the orbit.

Under general anæsthetic, an incision 3 centimeters long was made through the lower lid parallel to the lid margin. A blueish lobulated multi-locular cystlike mass lay directly under the fascia tarso-orbitalis and was freed with some difficulty by blunt dissection. During the dissection, one cystic portion ruptured and a small amount of dark brown fluid was evacuated, leaving a collapsed and empty cavity.

The mass was completely removed, leaving a funnel-shaped cavity about 5 centimeters deep. Three days later, the eyeball was in nearly normal position and binocular vision was present. Within two weeks, the eye was in normal position, and the only remaining trace was the scar of the linear lid incision.

The tumor was an irregular pyramidal shaped mass, about five centimeters long and the base measuring about two and a half centimeters in diameter. It was somewhat lobulated and of a distinctly blueish hue. Histologically, the tumor proved to be encapsulated in a rather dense fibrous connective tissue which showed a moderate degree of lymphocytic infiltration. Cavernous spaces, lined with a single or at times a double layer of very flattened endothelium whose cells were widely separated, formed the main mass of the tumor. These spaces are filled with coagulated serum throughout which are scattered some poorly stained red blood cells, a few isolated lymphocytes and some peculiar homogenously stained round bodies that are probably coagulated cell débris. Surrounding the cavernous spaces, which are not connected, is a connective tissue stroma, containing a moderate amount of fat. The entire stroma is irregularly infiltrated with lymphocytes, partially scattered and partially clumped into nodules. In some places these nodules are so dense that true lymph follicles, even containing a germinal center, can be differentiated. Innumerable blood vessels of all calibers are present and all have enormously thickened walls. The thickening is principally due to an increase in the size of the intima, although the connective tissue is also increased in amount. There is some lymphocytic infiltration of the vessel walls and surrounding tissue.

Anatomic Diagnosis.—Cavernous lymphangioma of the orbit.

CAPSULOTOMY BY A NEW PROCEDURE.[1]

By Dr. A. E. EWING, St. Louis, Mo.

(With three illustrations on Text-Plate XVIII.)

IN 1910 I became interested in devising a method for removing the lens capsule in senile cataract extraction which would be accompanied by the least disturbance to the eye. I had experienced many bad results from the ordinary cystotome and sickle needle capsulotomies, which often required subsequent discission of membranes, not only in my own extractions but in the extractions of my esteemed colleagues, Dr. Green and Dr. Post. It seemed to me that these results might be avoided and that this could be accomplished with less disturbance in the initial operation. My first innovation was with the de Wecker scissors. The blades of this instrument frequently slipped over the capsule, and a toothed scissors was substituted, then a knife forceps with a tooth at the end of each blade, and then another knife model with a sinuous knife edge, as in the ordinary bread knife.

My experience with these several forms of instruments taught me that the texture of lens capsules varied greatly, more than can be determined from careful inspection, and that capsules might be classed as tender, moderately tough, and tough. Tender capsules are usually found in immature cataract, and cataract that is just ripe, sometimes in the over ripe or Morgagnion variety. However, the over-ripe cataract is liable to have a capsule that is more fibrous and which will have a dense tough membrane to be dealt with later. Cataracts which follow corneal ulcers, iritis, choroiditis, and glau-

[1] Read at meeting of the American Ophthalmological Society, June, 1920.

ILLUSTRATING DR. EWING'S ARTICLE ON "CAPSULOTOMY BY A NEW PROCEDURE."

AGE 49. Old central nebula of the cornea. Extraction January 19, 1916. V. = 20/38. Reading vision 5 point type. 1920, May 20, V. = 20/38.

AGE 55. Old choroiditis. Extraction October 22, 1917. Tough capsule. V. = 20/30. Reading vision 3½ point type.

AGE 50. Extraction December 1, 1917. V. = 20/20. Reading vision 3½ point type.

AGE 74. Extraction April 4, 1918. V. = 20/30. Reading vision 3½ point type. 1920, June 1, V. = 20/30.

AGE 52. Extraction May 25, 1918. V. = 20/20. Reading vision 3½ point type. 1920, May 11, V. = 20/30.

AGE 52. Old central nebula of the cornea. Extraction October 8, 1918. V. = 20/38. Reading vision 5 point type. 1920, May 20, V. = 20/38.

AGE 68. Extraction November 15, 1919. V. = 20/24. Reading vision 3½ point type.

FIG. 2.

Diagrams which illustrate the character of pupils obtained with the Abscission Capsule Forceps.

FIG. 1.

Abscission Capsule Forceps. A schematic drawing which shows the construction of the blades.

AGE 53. Extraction December 11, 1919. V. = 20/20. Reading vision 3½ point type.

AGE 66. Extraction March 23, 1920. V. = 20/20. Reading vision 3½ point type.

AGE 53. Extraction April 7, 1920. V. = 20/20. Reading vision 3½ point type.

AGE 58. Extraction April 12, 1920. V. = 20/38. Reading vision 3½ point type.

AGE 67. Glaucoma. Previous iridectomy. Tough capsule. Extraction April 14, 1920. V. = fingers at one foot.

AGE 53. Extraction April 27, 1920. V. = 20/20. Reading vision 3½ point type.

AGE 57. Extraction May 29, 1920. V. = 20/30. Reading vision 3½ point type.

FIG. 3.

Diagrams which illustrate the charac of pupils obtained with the Abscis Capsule Forceps.

coma are apt to be accompanied by tough capsules and not infrequently by tender zonulas. In my trials with scissors I discovered that tender capsules were often slippery and that the scissors blades would glide over their surfaces without making any impression. The forceps with the undulating knife edge not infrequently would act in the same manner. The failure of these instruments to bite into all capsules led to the construction of the instrument the blades of which, greatly enlarged, is illustrated in the accompanying schematic drawing (Fig. 1). The handle may be such as to suit the idea of the operator. The blades differ from those of other capsule forceps in that the teeth are sharp and pointed and the sulci in between the teeth are ground to a knife edge, thus forming a series of cystotomes set at an angle in such a way as to cut as the blades are closed. None of the teeth touch when the blades interlock except the teeth at either end of the blades, the interlocking of these teeth being necessary in order to cut the incised portion of the capsule away from the remainder of the capsule.

The manipulation of this form of forceps is the same as with other forms of capsule forceps with the addition that when in position the blades are opened and closed several times with two purposes in view, the certainty of dividing the capsule the full length of each blade, and the chopping of the soft cortex into fragments. In withdrawing the forceps it should be brought a little forward as the teeth may engage the nucleus and drag it upward in the capsule. In this event the nucleus should be replaced with the spatula. The lens is then expressed in the usual manner, as a rule leaving a clear pupil.

With sickle needles and cystotomes the mechanical action is pressure backward and traction on the zonula from one side to the other. With the majority of capsule forceps the traction is on the capsule from either side and in the withdrawal of the forceps also from below, necessitating traction on the zonula at the sides and below, and from above in the final withdrawal. In this last manipulation there is always danger of the loss of vitreous. With the model here presented these dangers are obviated. The teeth engage the capsule with almost no pressure and the cutting is clean and practically free from traction. It has occurred with me in several instances that the end teeth have hung the capsule, and its lower

margin has floated upward in the delivery of the lens. However, in these instances the capsule returned to its position and caused no later trouble. This accident is not likely to happen if the teeth are very sharp.

With the general run of extractions with this instrument as will be seen from the diagrams (Figs. 2 and 3), there is a further special advantage in its action in that the capsule about the upper margin is not broken from the zonula. This is a protection against the loss of vitreous. Possibly there is no advantage in retaining the capsule in its position, but to me, it is a protection against injury to the zonula and the anterior portion of the vitreous. If these injuries can be prevented I believe it means safety to the future of the eye.

Another apparent advantage is the retention of any remaining lens cortex within the capsule. It is pretty well established that lens substance does not make trouble unless it is in contact with the iris. I have seen this demonstrated in several cases in which considerable cortex remained, and was slowly absorbed without giving trouble.

A further advantage is that the several cystotomes chop the cortex into fine fragments in the opening and closing action mentioned above, which causes it to come away more readily as the nucleus is delivered. This has seemed to be of importance because from a number of cases which have been operated on I have acquired the impression that the cortex mainly occupies the anterior portion of the lens. This observation I once mentioned to Dr. Alt and he said that this had been demonstrated by Becker many years ago, but did not give me the reference, and I have not happened to run across it. Shahan has reminded me that in the accommodation the anterior portion of the lens is chiefly in action and has suggested that this may have something to do with the nucleus being nearer the posterior capsule. In the few lens sections of normal eyes of persons about 45 years of age that I have been able to examine, I have found very little difference in the width of the cortex anterior and posterior to the nucleus, but clinically there does seem to be a difference.

For the purpose of illustrating the action of the forceps on the capsule a number of average pupils are shown in the accompanying diagrams (Figs. 2 and 3) together with the age of the

patient, the date of operation and the visual results. Since I have been employing these forceps my visual results have been improved, and I have seldom had to resort to a secondary discission.

As with everything in the instrument line that is new and difficult, I have had trouble in getting these forceps made properly. I am indebted to Mr. Hermann Weder of the Weder Manufacturing Company, Philadelphia, for his patience in helping me to perfect the instrument. It should be very sharp and several should be kept on hand to permit of their return to the maker to be resharpened, as in the case of cataract knives.

I wish to add further that these forceps should never be depended on when the pupil is filled with blood, as the iris may become engaged and the result might prove to be disastrous. It is intended for cases in which the margins of the pupil can be easily outlined. In these last cases it has never failed to remove the central portion of the capsule.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. CONRAD BERENS, Jr., Secretary.

MEETING OF APRIL 15, 1920. DR. A. E. DAVIS, CHAIRMAN.

A meeting of the Section on Ophthalmology was held in conjunction with the meeting of the New York Academy of Medicine on April 15, 1920.

Dr. W. Holland Wilmer of Washington, D. C. (by invitation) read a paper on **The injurious effects on the eyes of the various toxæmias** which appears in this issue of the Archives.

Discussion: Dr. Warfield T. Longcope: The paper of Dr. Wilmer, which we have all listened to with so much interest, emphasizes again the importance of focal infection as the cause of pathological changes at a distance from this focal infection. One may regard the presence of focal infection perhaps from two related points of view. First: from the standpoint of preventive medicine, and second: from the standpoint of therapeutics. It is generally recognized, now, as Dr. Foster has already pointed out, that a large proportion of individuals do suffer from focal infection over a period of weeks, months, or years, sometimes during the course of their lives. And as far as we can determine, only a certain proportion of such individuals show any ill effects from carrying these infections, that can be discovered with our present method of examination. On the other hand, evidences are accumulating to show that there is a direct relationship between focal infections and such conditions as chronic arthritis, endocarditis, or, as Dr. Wilmer has so well pointed out, a variety of pathological changes in the eye. The latent danger, therefore, to patients

carrying focal infections, is sufficient indication for removal if possible, of such foci, and thus from the standpoint of general prophylaxis and preventative medicine, there should be a careful search for and removal of local infections, such as those about the teeth, tonsils, sinuses, etc.

It is, on the other hand, very difficult to determine in any given case the exact relationship between focal infections and the systemic diseases, especially since the lesions are not specific either in pathology or ætiology. It is impossible to state definitely that an apical abscess is the cause of chronic arthritis. For this reason, one case of which Dr. Wilmer spoke is of much importance. I refer to the patient who suffered both from focal infection and tuberculosis, and in whom the pathological changes in the eye were found ultimately to be caused, not by this focal infection, but by tuberculosis. This illustrates one of the difficulties encountered in such cases.

Ultimately, no doubt, through the careful and constant study which is being devoted to this problem, methods may be devised by which more accurate diagnosis may be made than is at present possible. For it would be a great advance, if by any means, one could determine definitely the type of focal infection in one portion of the body which was the cause of a local disease in some distant organ.

Dr. NELLIS B. FOSTER said that Dr. Wilmer had touched upon a number of questions that were not only interesting to the ophthalmologist, but equally interesting to the internist. Some of the questions which Dr. Wilmer had been forced to pass over rather cursorily were of very profound significance and, in fact, went to the roots of questions of pathology. This question of focal infection was one that was very much to the front at the present time and was one in which they were all primarily concerned. Dr. Foster then called attention to certain points by way of caution in deductions based on evidence that at first sight seemed quite conclusive. All knew how frequent focal infections were. Beyond a certain period of life it was doubtful if any of us escaped, and so we must postulate a second factor, namely, individual predisposition. since some individuals maintain robust health in spite of these known foci. Dr. Foster said he did not wish to convey the impression that the expression, predisposition, was used in a

scientific way at all. His meaning, he said, was best brought out by Dr. Wilmer's remark about antityphoid inoculation in respect to the eye. It did not require any stretch of imagination to think that in certain individuals antityphoid vaccination might give rise to certain demonstrable lesions in the eye. As was known, the great majority of persons inoculated with antityphoid vaccine showed only slight and transitory symptoms, a little fever, malaise, and slight muscular stiffness. But there was a small minority in which quite a definite train of graver symptoms developed. To one of these types he wished to call attention because, so far as he knew, only a few cases had been seen and he himself had seen a number. These were cases that showed a type of reaction that might be called purpuric. The manifestations in these individuals were first, a purpuric rash such as one saw typically in cerebrospinal meningitis. The rash appeared twelve hours after inoculation and was associated with fever and might be associated with hemorrhages. In some cases there were only a few hemorrhagic spots on the skin, along with hemorrhage from the kidneys or intestines and epistasis. If hemorrhage occurred in the skin, kidneys, or intestines, it stood to reason that it might occur in the central nervous system, and he had seen one case in which it did occur causing a transverse myelitis and a number with meningismus. We had here again the same factor to which he had called attention and which must be constantly remembered, namely, that there were exceptional individuals with unusual predispositions. These cases of atypical reaction Dr. Foster said he had seen in the army, and they were all apparently healthy individuals; he had examined them and found no evidence of disease. This brought him to the second point he wished to mention, which was that these hemorrhages in the retina, or elsewhere in the body, were due either to changes in the blood vessels or changes in the blood. We knew at the present time no other cause for hemorrhages, except changes in the endothelium of the arteries, and changes in the blood itself; for example, in infectious diseases there was a proneness to embolism or thrombosis as well as to hemorrhages. These hemorrhages that Dr. Wilmer mentioned as occurring in the eyes of young men could be explained in no other way than that just offered. Cerebral hemorrhages were not at all a

rare thing even in children where there could not be demonstrated any such disease as syphilis, which is thought of as the ætiological factor in degeneration of the vascular system. It is thought such hemorrhages were explained by the effect on the blood vessels of past infectious disease, perhaps a trivial disease of childhood. If, as sometimes happened, these cerebral hemorrhages were so severe as to cause death, it seemed not at all an incorrect deduction that they might occur in the small vessels of the eye, because the eye is in fact a projection of the central nervous system. One other point which Dr. Foster discussed was in regard to the treatment of uveitis with thyroid. He said he had had occasion to look into that subject. A good many ophthalmologists seemed to believe that many disturbances of the eye were of endocrine origin, and thyroid extract was recognized as the one mode of approach in the treatment of uveitis. He had been somewhat puzzled over that fact and thought that the supposed benefit of that treatment was due to other causes than that suggested. Uveitis was a disease that progressed in waves, and the period of improvement might conceivably be coincident with the administration of thyroid extract. Another reason might be that small doses of thyroid were stimulating, and brought about the same improvement that might be brought about by a change in climate, stimulating the appetite, increasing body weight and rejuvenating in the larger sense some dormant functions; so that the improvement of uveitis which occurred in individuals who were subnormal in health could be explained on those grounds. While improvement in uveitis might occur under the administration of small doses of thyroid, it was inconceivable that large continued doses of thyroid extract should cure the disease. The assumption of a relationship of some other obscure diseases of the eye to other endocrine disturbances, so called, seemed to him simply a mask for our ignorance. He would like to know what Dr. Wilmer thought about it.

Dr. ROBERT G. REESE, the relationship between toxæmias and diseases of the eye is a complex one, and unfortunately the clinical picture is by no means characteristic. We are apt on account of our wonderful successes, to forget there are other ætiological factors in diseases of the eyes and adnexa.

While it is true that all diseases of the uveal tract are either

of septic or toxic origin, the successful elimination of these agents is often perplexing. The history is quoted of a woman 50 years old with bilateral uveitis of eight year's duration. She received tuberculin, subconjunctival injections, and antiluetic treatment. The tonsils and some abscessed teeth were removed. General examination showed Paget's disease, aortitis and colitis. The patient is at present getting streptococcus vaccine, arsenic, and salicylates.

Dr. GEORGE H. BELL: Toxæmia from food intoxication, bad teeth and tonsils, is the most important subject before the medical profession to-day. Last June at the meeting of the A. M. A. I stated that a dirty mouth was one of the greatest menaces of the human race. The late Dr. Osler said recently that bad teeth were causing more ill health and misery in the world than strong drink. From time to time in the last ten years, I have called the attention of the profession to the fact that modern dentistry is producing more disease than any other cause. My first paper on this subject was read here at the Academy of Medicine in October, 1910. What are the causes of toxæmia and what are its effect on the eye? If we exclude syphilis and gonorrhœa, I believe that all the eye conditions that we see, are caused directly or indirectly by focal infections, and the three most potent ones are bad teeth and tonsils and food intoxication, all of which can produce a general toxæmia, which may have a local manifestation in the eye, in the form of uveitis, choroiditis, iritis, episcleritis, optic neuritis, and keratitis. J. Herbert Parsons in 1908 said in his *Pathology of the Eye*, that oral sepsis is an undoubted cause of iridocyclitis, owing to the absorption of toxins into the circulation.

I realize that there are a lot of things we cannot prove in regard to the doctrine of focal infections and toxæmia. But when we see case after case of iritis, choroiditis, and episcleritis get well after removing the foci of infection; then, in the absence of positive proof, the process of elimination is good enough for me.

I believe that an endogenous septic endophthalmitis may occur in any eye any time, whenever there is present in the body a focus of infection from which toxins or bacteria can escape into the circulation. Why the optic nerve should be

affected in some cases of toxæmia, the uvea in other cases, the cornea in some and the vitreous in still others, I am not able to state, nor am I able to state how it is brought about. We must all admit, however, that toxæmia may result from chemical changes in the intestinal contents, and that the absorption of bacteria and their toxins does take place, and that the blood stream is the carrier of the infection.

Dr. JAMES G. DWYER wished to congratulate the speaker on the paper of the evening, and had only wished that more of the statistics of the various types of cases had been brought out. He wished to speak of the various types of infections, and bring out some of the points that had impressed him during the last ten years. From a personal experience of over twenty thousand Wassermann reactions done during the last seven years, and from an investigation of over one hundred and fifty eye cases of so-called focal infections, he wished to say the following:

First: Syphilis. The diagnosis of syphilis of the eye is comparatively easy, as the above experience has shown, that in the vast majority of syphilitic eye cases, the Wassermann reaction is reliable, as the lesion is so situated that a positive reaction is easily obtained.

Second: Tuberculosis. Regarding tuberculosis, the intracutaneous test, in contradistinction to the superficial skin reaction, has proven in the last two years to be thoroughly reliable, as an evidence of active tuberculosis and can be followed by the subcutaneous test, care being taken to carry out this latter test thoroughly.

The big questions arise as to the focal infections from the teeth, tonsils, intestinal tract, and other occasional foci, and this is where we need light.

His experience leads him to believe that the laws of physics relative to a fluid under pressure, was a very important factor. Focal infections were more apt to occur under such conditions, as an apical abscess at the root of a tooth, with the pus in a closed cavity under pressure, than in pyorrhœa, where there was an open infection. The same was true of old fibrous tonsils with pus shut up in closed crypts, or in tonsils that had undergone partial removal, where the mouths of the crytps were closed by scar tissue. The same reasoning applied to the intestinal tract or to the prostate gland, etc.

Following this reasoning a step further, the thought occurred that the whole process, may be one of bacterial anaphylaxis, in contradistinction to serum anaphylaxis, and that this may in the future lead to some scientific data. An immense amount of work on bacterial anaphylaxis has been done and a perusal of the literature may suggest some methods of attacking the problem.

Dr. WALTER B. JAMES: Dr. Wilmer's delightful paper presenting this timely subject in so clear a way has done a service to the whole profession of New York, not only to those practising in the field of ophthalmology but to everybody charged with the responsibility for the care of the sick, no matter what part of the body may be at fault. Whatever specialty we may be practising, we have come to realize that focal infections, and indeed the other intoxications, have a far-reaching significance. While the expectation of human life has increased very greatly during recent years, and entirely through the efforts of the medical profession, it is generally admitted that this increase has been brought about by improvement in the mortality rate of infancy and childhood rather than because of any well marked impression made upon the death rate from the diseases of later life.

Dr. Wilmer's paper suggests quite a different point of view towards these later diseases than that which has obtained during the past thirty-five or forty years and before. It has been customary to assume that when a man of middle life has a disease, for instance, of the kidneys or of the heart or of the joints, and when by the use of instruments of precision and careful diagnostic methods we have located the lesion and told him that his symptoms are due to Bright's disease, hardening of the arteries or sclerosis of the heart muscle perhaps, and have made a prognosis telling him how long he has to live, we have been wont to feel that we have done our duty. To-day, fortunately, we are taking less interest in the minutiæ of physical diagnosis and are giving more attention to the study of the ultimate origin of the disease in the individual case.

Physicians used to ask a man of fifty or sixty who was suffering from Bright's disease or other organic trouble what his father died of. When he replied, dropsy at the age of sixty, the physician would say, this is about what you have to expect.

We used to ask a man if he was a hearty eater and if he replied that he was, we ascribed his trouble to eating too much; if he said that he was a very light eater, we perhaps attributed it to too little nourishment. We asked him if he was a hard worker and generally his wife answered that her husband had always worked himself to death, and then we said no wonder you have a chronic disease. As a matter of fact, it is a matter of much doubt whether people do get Bright's disease or heart disease because they work too much or too little, or eat too much or too little, and we are not at all sure now even that alcohol has played as important a part in the causation of diseases of middle life as we had once thought.

Therefore this modern conception of medicine and diagnosis and its purpose as presented by Dr. Wilmer this evening, is intensely interesting and applies to every branch of medicine and to the diseases both of the body and the mind, for even in mental diseases it is becoming more and more clear that the body, and the entire body, should be searched for causes of the malady. There is probably a definite cause for every kind of disease and we should demand to know this cause if it is discoverable by any means at our command, and if we cannot discover it, we should honestly admit that the fault is our own.

One of the great difficulties of course in treating diseases of middle life is that we are apt to find that they are not simple but very complicated. The late Dr. Jacobi, in his delightful way, once told me that he preferred to treat children rather than adults because almost invariably a child has but one disease at a time, whereas adults rarely have only one.

The profession should accept the principle that when an individual manifests any departure from the normal in any function, the making of a diagnosis in the old-fashioned sense is only the beginning; that there is a definite cause for this disturbance and that this cause should be sought by every means that medical science offers.

Dr. REESE in his discussion, regretted that Dr. Wilmer said nothing of his failures. Dr. Wilmer, like the rest of us, is human and of course he has had failures. Like the rest of us he has had at his command only such knowledge of physiology, pathology, and causation as medical science of to-day offers, and while he has pointed out to us that many cases of serious

organic diseases of the eye have a remote physical cause in some part of the body, perhaps far distant from the eyes, yet there are doubtless other causes of these same eye lesions which are not accessible to us to-day but which will certainly be accessible to the physician of the future, if the profession continues to take the broad view of medical science that it always has taken. There are perhaps causes other than focal infection and other intoxications, causes that we have not yet dreamed of, but some day they will be known and understood. Future studies and the lapse of years will probably open up new and wonderful vistas for medicine, and with these the ability to either ward off or cure or ameliorate a good many of the diseases of middle and later life which have hitherto proved so obstinate. Of course chronic rheumatism, as well as eye lesions and probably a good deal of vague ill health without definite local complaint, are caused by foci of infection in the teeth and tonsils, but we have all seen plenty of cases of this type where the disease went on just the same after the teeth and tonsils were removed. I have seen a number of cases of very obstinate rheumatism of the rheumatoid arthritis type, in persons who had completely recovered from a pulmonary tuberculosis, usually with some cavity formation and in whom no local cause could be found in the teeth or in the tonsils, and in whom it seemed at least possible that the intoxication came from a healed cavity at the apex of the lung which gave few or no symptoms of the ordinary type.

Then there is the alimentary canal, especially the colon and the iliosacral valve, offering possibilities of ill health from intoxication, but this is a chapter which is always vague and upon which a great deal of work still remains to be done.

Dr. Wilmer's paper is interesting then to those practicing in every field of medicine, pointing out, as it does, defects in the teaching of diagnostic medicine and emphasizing the need of searching more diligently for the cause of disease in each individual case. The medical profession of New York is deeply indebted to Dr. Wilmer for his willingness to come to New York, especially at a time when traveling is no simple matter, in order to lay before it the results of his vast experiences and his own philosophical reflections upon these experiences.

Dr. W. H. WILMER in closing the discussion said: Unfor-

tunately one cannot always report cures; for the fact must be borne in mind that all cases cannot terminate favorably, even where the toxic source has been discovered, on account of the damage already done—as in the case of a central choroiditis or retinitis proliferans.

When the influence of oral sepsis upon the general system was first appreciated there was a tendency to sacrifice teeth recklessly. There is always a tendency for the pendulum to swing just as far the other way. The middle course is generally the right one.

Undoubtedly apical abscesses are far more dangerous as a source of toxæmia than pyorrhea alveolaris. But he is convinced that some ocular lesions occurring in his practice have been due to pyorrhea alveolaris when the process has been extensive and the patient's resisting powers have been lowered.

REPORT OF THE ANNUAL CONGRESS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. H. DICKINSON, London.

The Annual Congress of the Society took place in London on April 29th and 30th and May 1st, under the presidency of Mr. J. B. Story, P.R.C.S.I.

The President's Address.

The President, in his introductory address, said that two questions had aroused much interest in the ophthalmological world during the past twelve months. The first was the establishment of a higher diploma to distinguish the ophthalmological specialist from the practitioner who had no special knowledge and had had no expert training in the subject. The second was the teaching and examination of medical students in ophthalmology before admission to the Medical Register. On both these matters valuable reports had been published by the Council of British Ophthalmologists. It was this second heading which occupied his attention in this address. A certain knowledge, both theoretical and practical, of ophthalmology ought to be possessed by every person admitted to the Register. There were two reasons for this: the vast majority of practitioners were certain to have to diagnose and treat diseases and injuries of the eyes in certain circumstances when the aid of the specialist could not be promptly obtained, if at all. The second reason was, that in many serious constitutional disorders the evidence afforded by ocular conditions was most important, and often they were the

symptoms which induced the sufferer to seek medical advice. Interstitial keratitis was often the first evidence of infantile syphilis, even before the classical teeth of Jonathan Hutchinson had erupted. Ocular tuberculosis might be the first manifestation of that disease, and acquired syphilis might make its appearance in the iris or choroid or retina long after the patient had quite forgotten having had the original disease. Ocular signs were important in tabes, disseminated sclerosis, meningitis of all varieties, brain tumors, nephritis, diabetes, and arteriosclerosis among the common maladies. Every qualified person should have some knowledge of glaucoma, and of the effects of atropine in aged eyes.

Last year, the Council of British Ophthalmologists brought the question of ophthalmological teaching before the General Medical Council, recommending that compulsory attendance at an ophthalmic hospital should be required of all students, and that there should be an examination by ophthalmic surgeons. The reply to that was a recommendation for ophthalmic hospital attendance, but a special examination was thought to be unnecessary. The action of the General Medical Council was regarded with astonishment in Ireland, where, for thirty years, every medical student had given three months' compulsory attendance at an ophthalmic hospital, and had to undergo an examination by two or more ophthalmic surgeons, and the results had been most beneficial to the young doctors, and perhaps still more so to their patients. The object was not to turn out half-educated specialists, but to prevent men being let loose on the public who saw no difference between a leucoma corneæ and a cataract, and who mistook obvious iritis for equally obvious conjunctivitis.

It was held by many that the curriculum would be overloaded if ophthalmology was given this position in medical education. The reply, which was unanswerable, was that no such overloading had been caused in Ireland. There should be no specialty of which the registered practitioner should be quite ignorant. An examination, to be of use, must be a practical and clinical test: a paper examination he considered to be quite useless. Mr. Story related some of his examinership experiences, and, in conclusion, said he feared that the pressure of the Society would have but little effect on the

Mandarins of the General Medical Council, but he had great hopes that the weight of the great mass of the profession who were not specialists would succeed in getting these necessary reforms carried out.

Papers.

Mr. C. H. USHER read a paper on **enlarged corneæ in goldfish.** The paper was called forth by the record of a case of enlarged corneæ by Mr. Treacher Collins. In the fish examined the corneæ seemed to be of uniform thickness. Enlargement of the eyeball had been found in a number of different kinds of fish: these died if left alone, but the condition could be cured by careful attention to the water and food. The gas-bubble disease of fish kept in aquaria was attributed to diminution of pressure. The goldfish examined lived in three small ponds connected by short pipes to allow both water and fish to pass from one to the others. The source of the water was a spring which had been condemned years before for drinking purposes, as it was held to be contaminated with sewage. Hofer repeatedly saw opacity and perforation of the cornea in trout which lived in water containing iron. Burge produced corneal opacities and cataract in eyes of goldfish by ultra-violet rays when the fish were living in certain solutions, but failed to get the same results when they were living in tap water which contained very small quantities of those salts. Gaylord found that artificially reared trout confined in tanks one above the other on a single water supply showed an increasing proportion of thyroid hyperplasias from the highest to the lowest tanks in the series. Adding to the tanks pure water, iodine, mercuric chloride, or arsenic retarded or prevented the hyperplasia. Marine and Lenhart found that three chief conditions influenced the thyroid growth in fish: a limited water supply, overcrowding, and overfeeding with a highly artificial and incomplete food.

Mr. TREACHER COLLINS read a paper entitled **megalocornea and microcornea.** In a case he described in 1913 as one of buphthalmos with full vision and without cupping of the disk, it was evident that the enlargement of the cornea could not be attributed to stretching due to increased intra-

ocular tension. This was shown by the absence of any of the signs of glaucoma, such as contraction of the field of vision and cupping of the optic disk, also by the absence of any ruptures in Descemet's membrane, or any want of definition at the sclerocorneal margin. He described a fresh case which he had recently seen in a woman who was the subject of a peculiar form of dwarfism. He attributed the condition of the cornea to some disturbance in the growth-regulating mechanism. He also showed that there was a condition of under growth of cornea met with in otherwise well-formed eyes.

Mr. JOHN ROWAN read a contribution on **non-operative treatment of glaucoma,** his title being "Are not some cases of glaucoma better treated without operation, and, if so, what are the indications?" The great object, he said, was to determine the cause of the increased tension. If the general factors producing it were known, something in the way of prevention might be done. Several cases had been kept under eserin for periods of months, one for two years, keeping back further developments, and in some cases resulting in improvement. If for any reasons, general or otherwise, an operation seemed inadvisable, keeping the patient under eserin and strict observation seemed best, but in the presence of signs of advancing disease, operation should be done. In the majority of cases he advised operation, especially early operation.

Sir ANDERSON CRITCHETT, in the ensuing discussion, described glaucoma as the bugbear of the ophthalmic surgeon. Admittedly operation should be done early, but in some instances, whatever the type of operation, or however skillfully done, there was a disappointing declension of vision. Some had ceased to operate for chronic glaucoma, and he would be very glad to learn what were the indications for operating, and for abstaining from operation, respectively.

Mr. HARRISON BUTLER'S practice was to operate in chronic glaucoma when the tonometer showed the eye tension was raised and there were signs of functional failure.

Dr. G. MACKAY spoke of the tendency to the formation of pigmentary adhesions between iris and pupil, with diminished transparency following the prolonged use of eserin or other miotic.

Dr. RAYNER BATTEN regarded the cupping of the disk as the

disease, and the glaucoma as the symptom: the cupping was progressive, whether or not the tension was relieved.

Mr. RICHARDSON CROSS said that if central vision was good, and there was great narrowing of the fields, especially towards the fixation point, and there was an absence of inflammatory symptoms, one could safely rely on miotics. No dogmatic statements could be made which were applicable to all cases.

Mr. TREACHER COLLINS agreed that many cases of chronic glaucoma could be kept in check by the continuous use of eserin, but if the symptoms mentioned by Mr. Cross increased, he advised operation. But such factors as the age of the patient and his expectation of life and his blood pressure must be taken into consideration. If the blood pressure were high, that was an additional danger in operating.

Mr. R. R. CRUISE thought the number of cases in which the pressure had been overcome by drops must be small in comparison with those in which the results were deplorable. He spoke highly of the value of the tonometer in these cases, not only in estimating the intraocular tension, but for judging of the progress in a given case.

Dr. A. HUGH THOMPSON said that as the ocular tension might vary from time to time, even at different hours of the same day, alteration in the visual fields was a surer sign of the condition of a case of glaucoma than the tension.

Mr. A. GREENE (Norwich) thought it was to the physician one must look for an explanation of the cause of glaucoma: he should be asked to supply a drug which would control the secretion of the ocular glands, especially the ciliary.

Mr. B. CRIDLAND thought most ophthalmic surgeons were not in favor of simple iridectomy for chronic glaucoma, especially in cases in which the field of vision was contracted and involved the fixation point. When "operation" was spoken of, he thought it should be understood to mean decompression. In several cases he had obtained satisfactory fistulization without touching the iris.

The PRESIDENT said that in cases in which the tension was distinctly high and the fields were contracted, and there was a central scotoma, he advised operation. During recent years, the operation he had almost exclusively done was the trephine operation.

Mr. T. HARRISON BUTLER read a paper on **infection after cataract operations,** in which he discussed some reasons for failure after cataract operations. There were two types of inflammation, having a different ætiology. The first was the acute wound infection, the septic hyalitis, panophthalmitis, most probably due to infection from without, mostly by the pneumococcus, often derived from a diseased sac or an ethmoiditis. In his second group the cause was mostly an endogenous infection, or due to general toxæmia. Diabetes he regarded as a fruitful cause of failure.

After an afternoon spent at the Royal London Ophthalmic Hospital inspecting and discussing clinical cases, the evening was devoted to a debate on **diabetes in relation to diseases of the eye.** It was opened by Sir ARCHIBALD GARROD, K.C.M.G., and Mr. R. FOSTER MOORE.

Sir ARCHIBALD GARROD addressed himself chiefly to the subject of diabetic retinitis. In the diabetic form, the ocular hemorrhages were apt to be guttate rather than flame-shaped, the white spots more opaque and sharply circumscribed, more scattered and less apt to group themselves around the maculæ. But albuminuria in diabetes did not necessarily point to serious renal damage: the amount of albumin in renal cases gave no sure clue to the gravity of the kidney lesion. Albuminuric retinitis was met with in young patients, even in children. This suggested that the occurrence of retinitis in diabetes was not to be attributed to the accumulation of sugar in the blood, nor of the accompanying acetone bodies. A contributary cause must be looked for other than the disorder of carbohydrate and protein metabolism, and if it were true that the retinitis was associated with cardiovascular changes, this suggested an explanation. Most of the diabetic patients in his wards who had developed retinitis had evidences of renal disease also. He suggested that both diabetic and albuminuric retinitis was associated with high blood pressure and arterial changes. A line should be drawn between acute diabetic cases in early life, and the mild diabetes of middle life which might persist for many years without grave detriment to health. Cataract seemed to be the commonest eye trouble to which diabetics were specially liable. He urged the importance of diabetic patients being put through a course of hunger

treatment before an attempt was made to operate on the eyes.

Mr. FOSTER MOORE's paper discussed the subject in much detail, based upon careful observation of 62 cases. He said the chief ocular complications in diabetes were retinitis, cataract, retrobulbar neuritis, retinal and vitreous hemorrhages, lipæmia retinalis. Lesser conditions met with included alterations in intraocular tension, in refraction, also iritis and debility of accommodation. These he considered in detail. Retinitis had affected his older patients only: there was only one as young as 39: these usually had arteriosclerosis also, and sugar and albumin in the urine were common too. Diabetics tended to develop hemorrhages into retina or vitreous. The prognosis of retinitis in diabetics was much less grave than in renal retinitis: 60% of Nettleship's cases lived beyond two years. The term "diabetic cataract" should be restricted to the cases of somewhat rapid opacity of lens seen in young diabetic subjects: it was always bilateral, and of a diffuse homogeneous type. A certain number of diabetics developed defective vision, in some the cause being retrobulbar neuritis. Concerning alterations of refraction, a certain number of observers had noted a variation with the amount of sugar excreted: in most cases a decrease in the sugar output lessened the degree of the myopia.

The contributions were fully discussed. Dr. CAMMIDGE spoke of observations on 350 cases of diabetes. He thought the age-incidence of cataract and retinitis which had been observed was only explicable by the chemical changes taking place in the body at the various ages. Glycosuria was not a disease: he had seen a number of young people who had persistent glycosuria which, however, was but little affected by changes in diet, and the health did not seem to suffer. Two main groups of diabetics could now be well established: the pancreatic and the hepatic. In the latter there was an increased formation of amino-acids, of which tyrosin was one, and there was an increased fat content in the blood, progressive as the patient became worse.

Dr. C. O. HAWTHORNE spoke of the association of ocular palsies with glycosuria, and of the fundus changes which might occur when sugar was present in the urine. Admittedly ocular

palsy was a rare event in diabetes mellitus, therefore the glucose present in the latter could not cause the palsy. It was probably, he thought, a peripheral neuritis affecting the terminations of one or other of the ocular nerves.

Mr. R. R. JAMES said all cases of cataract in diabetic patients in the hospital were first treated by the physician to lessen the sugar output before any operation was attempted on the eye. If it could be avoided, he preferred not to do iridectomy.

Mr. BURDON-COOPER spoke of finding tyrosin and cholesterin in lenses which had been removed from diabetic subjects. He had not yet tested such lenses for glycogen. He believed that the acids and ferments secreted by the ciliary body in the aqueous were responsible for the hydrolytic change in the lens.

The Prevention and Treatment of Ophthalmia Neonatorum.

Members paid a visit to a special hospital for the treatment of this condition, under the Metropolitan Asylums Board (St. Margaret's) and afterwards discussed the subject in the large room. The debate was opened by Dr. GIBBON FITZGIBBON (of the Rotunda Hospital, Dublin). Among 38,106 born in that institution in twenty-three years, the incidence rate of the disease was 0.24%. Practically during the whole of that time the Crédé prophylactic treatment was used. As soon as the child's head was born, the eyes were wiped clean of all mucus with swabs of boracic lotion, and after the child had been bathed, one or two drops of a 1% solution of silver nitrate were dropped into each eye. Often, he believed, the child was infected through passing through an unclean cavity. He expressed a strong faith in silver nitrate. He had found an efficient vaccine a strong help: the maximum dose for an infant was three to five millions.

Mr. M. S. MAYOU (surgeon to the institution) entered into the subject thoroughly. He had found that the meibomian secretion contained the xerosis bacillus on the third day of life, and it was almost constantly present soon after birth. If the fœtus passed quickly through the vagina, the chance of infection was much lessened. In one instance the first child of twins was infected, the second escaped it. He uttered a strong warning

against the use of silver nitrate by the inexperienced: for these, 10% protargol was safer. In the cases at this institution, the gonococcus was found in 60% to 65% of them: in the non-gonorrheal, the streptococcus was the only one of serious import. He said the question of immunity to the gonococcus needed more study than it had yet received: patients who had had one attack of gonorrhea were not rendered by any means immune thereby against another attack. He went fully into histological questions and the technique of treatment, setting forth the statistics of the institution. He concluded by some remarks on the training of students and midwives.

Subsequent speakers dealt with the matter in the light of their experiences at the various large cities, and the opener replied, elaborating his views for combating venereal disease, which was at the root of this trouble.

The meeting unanimously passed a resolution urging that teaching of students and midwives should be given in the institution on this subject.

REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SECTION OF THE ROYAL SOCIETY OF MEDICINE.

By Mr. H. DICKINSON, London.

CLINICAL MEETING OF THE SECTION ON OPHTHALMOLOGY.

This was held on June 9th, Mr. W. T. Holmes Spicer, the President of the Section, presiding.

Mr. R. S. Charsley exhibited a specimen which had been pronounced as **perithelioma of the lid.** The family practitioner had mistaken the tumor for an ordinary meibomian cyst, and had incised it. When the patient came to Mr. Charsley he removed the growth, and for two months thereafter the man remained in good health. The temporal bone then commenced to enlarge, and the patient noticed that his vigor was diminishing. Two months later still he developed weakness of the spine, and ultimately spinal curvature, probably due to tumor recurrence in the vertebræ. Death supervened six months after the tumor first became prominent. There had been no recurrence at the original site.

Mr. Treacher Collins's view was that the growth was alveolar sarcoma, while Mr. M. S. Mayou considered it was perithelioma.

Mr. Leslie Paton related a case of his own in which though the endothelioma was apparently thoroughly removed from the orbit, there was subsequent spread to a number of other glands, and death was immediately preceded by a large mediastinal growth, of the same histological nature as the original one.

Mr. A. W. Ormond exhibited a case of **neuro-fibromatosis** (von Recklinghausen's disease). There was extensive pig-

mentation over the body, and a number of soft tumors. The main complaint was of headache and failure of sight: his vision in each eye was $\frac{6}{18}$, and he had optic atrophy following papill-œdema. The Wassermann test gave a negative result. The hands and feet were larger than normal, and the supraorbital ridges very prominent: in addition there was some kyphosis. The systolic blood pressure was 105*mm*, the diastolic 80. Mr. Ormond thought the indication was some overaction of the pituitary body, probably following an affection of the fibrous tissue at the base of the brain. He exhibited skiagrams of the skull.

Mr. J. H. FISHER thought there had probably been some irritation of the pituitary gland, resulting in hypersecretion, and that this accounted for the acromegaly.

Mr. W. H. MCMULLEN showed a case of **cyst of the iris.** There was in this case no history of injury resulting in implantation of epithelium. The tension of the eye was normal, and the condition seemed to cause the child no inconvenience.

Mr. FISHER and Mr. TREACHER COLLINS thought there might have been an unnoticed puncture, and Sir WILLIAM LISTER spoke of the careless habit in some women of sticking needles and pins into handy pillows or cushions, on which the baby might be placed. A puncture of the eye might not be noticed at the time, and it would probably quickly heal. This view was supported by Mr. ORMOND.

The PRESIDENT exhibited a patient with horseshoe shaped opacities in the cornea. There was only one complaint, namely of gradually diminishing vision during the last few years. Only a negative history was obtainable.

Mr. G. W. ROLL showed a child with **herpes ophthalmicus.** The attack occurred in February last, simultaneously with chicken pox, the eruption remaining on the brow. Part of the eruption was along the course of the nasal nerve to the tip of the nose: the cornea also was involved. The association between herpes ophthalmicus and chicken pox had been frequently noted. He spoke of other recorded cases, as did the PRESIDENT and Mr. J. H. FISHER.

Mr. J. F. CUNNINGHAM showed a patient with a **mass which obscured the optic disk.** There was a history of trauma, and Mr. Cunningham thought it was due to a wound.

Dr. RAYNER D. BATTEN exhibited a patient with **superficial punctate keratitis,** of two years' duration, which had been very resistant to various treatments.

The PRESIDENT spoke of a similar case in which treatment seemed hopeless: eventually the condition seemed to wear itself out.

Mr. MCMULLEN's second case was one of **congenital malformation in the outer canthus.** The outer extremities of the left lids were separated by a low pad or cushion of tissue covered with skin. The suggestion of an amniotic band and adhesions before the displacement seemed to him a plausible one.

Mr. TREACHER COLLINS was reminded by this case of a class which was described in the "Ophthalmic Hospital Reports" by Sir George Berry. In the cases shown by that observer there was a symmetrical flattening of the malar bones, leading to the impression that the patients were brothers. He thought the most reasonable explanation was that there was delayed closure of the cleft between the fronto-nasal plate and the superior maxillary plate at the outer canthus.

Mr. W. L. HINE showed a patient with a **malignant sebaceous horn,** in which there was a large recurrence, and great benefit had so far accrued from a single (eight-hour) exposure to radium. The case was still under observation.

Mr. T. G. DOYNE showed a case of **furrow keratitis,** and Mr. WALLACE exhibited some of the daylight glass which was due to the research at Cornell University.

BOOK REVIEWS.

I.—**The Ophthalmoscope,** a manual for students. By G. HARTRIDGE, London. Sixth edition. 152 pages, 65 illustrations, and 4 plates. Phila. P. Blakiston's Son & Co., 1919. Price $2.00 net.

The many excellent features of this introduction to the use of the ophthalmoscope are so well known that this book has made a permanent place for itself. In this new (the sixth) edition the text has been revised and a few additions have been made. The colored drawings of the normal fundus are excellent and come up to the high standard that one looks for in English textbooks. Unfortunately the plates of the pathological changes are not only too few, but fail to illustrate the conditions described. With the exception of this limitation, the book admirably fulfills its purpose and will prove of great aid to the beginner.

A. K.

II.—**A Practical Treatise on Ophthalmology.** By Dr. L. WEBSTER FOX, Professor of Ophthalmology, Medico-Chirurgical College Graduate School, University of Pennsylvania, etc. Second edition. 831 pages, 6 colored plates, and 300 illustrations. New York and London. D. Appleton & Co., 1920.

This treatise has been carefully brought up to date and revised so that it is practically a new book. The outstanding features are the clearness of the text, the excellence of the illustrations, many of which are original, the unusual details of operative procedures, and the many therapeutic suggestions. The latter two particularly reflect the enormous experience of the talented author. The student and practitioner in ophthalmology will find this a very practical guide to the study and treatment of eye diseases.

A. K.

III.—**The Blind.** Their condition and the work being done for them in the United States. By HARRY BEST, Ph.D. 763 pages. New York. The MacMillan Co., 1919. Price $4.00.

The interest in the blind has increased so much in recent years that an authoritative book on the subject is very timely. The author has collected an enormous amount of material which is of the greatest value. The subject is considered under the headings of General Condition of the Blind, Blindness and the Possibilities of its Prevention, Provision for the Education of Blind Children, Intellectual Provision for the Adult-Blind, National Provision for the Blind, Organizations Interested in the Blind and conclusions with respect to the work for the blind. This gives the scope of the book and shows its value for study and reference to those engaged in this important field.

A. K.

IV.—**Swanzy's Handbook of the Diseases of the Eye.** Twelfth edition. Edited by LOUIS WERNER, Dublin. With illustrations, 671 pages. Phila. P. Blakiston's Son & Co. 1919. Price $4.00.

It is fortunate that Swanzy's well-known and excellent text-book is continued in new editions under the able editorship of Dr. Werner, so that oncoming students of ophthalmology may profit by this scientific yet concise presentation. In this new edition diseases of the cornea have been reclassified, chronic uveitis is treated in a thorough, up-to-date manner, and recent investigations on the cortical visual center are given. Some new operations have been introduced, such as excision of lacrimal sac, transplantation of mucous membrane for trichiasis, and others. The completeness of the subject matter is quite astonishing, and the wealth of excellent illustrations, many of them in color, is noteworthy. There can be no better text-book for the student and it is a pleasure to recommend it.

A. K.

V.—**The Nose and Olfactory Organs.** By J. PARSONS SCHAEFER, Professor of Anatomy, Jefferson Medical College, Philadelphia. 370 pages. 204 illustrations of which 18 are printed in colors. Phila. P. Blakiston's Son & Co. 1920. Price $10.00 net.

This study of the nose, the paranasal sinuses, and the nasolacrimal passageways is based on the basic conception of the underlying genetic and developmental history. The work begins with general embryology and development of the nose, then comes the anatomy of the nasal cavities; the maxillary, the frontal, the sphenoidal, and ethmoidal sinuses are taken up in turn. The nasolacrimal passages are carefully described. Of practical interest to the ophthalmologist is that at best but papery laminæ of bone intervene between the ventral portion of the ethmoidal labyrinth and the lacrimal sac and the nasolacrimal duct. Congenital dehiscences are extremely commonplace. Close relation exists between the mucous membrane of the nasal and the nasolacrimal fields through an abundant network of lymphatic vessels. This explains the infection of the tear sac in many cases. The author furthermore suggests that the success or failure of non-surgical treatment of diseases of the tear passages is dependent on the anatomic type of the nasolacrimal duct and ostrium present. Probing of the nasolacrimal duct would seem ill-advised from an anatomic viewpoint. The nasal mucous membrane, the blood and lymphatic systems, and the nerves of the nose and accessory sinuses are the subjects of the remaining chapters.

The intricate anatomy of the nose has always been a favorite field for study and numberless textbooks and monographs have appeared in all languages. No book has been published which in the reviewer's knowledge can compare with this in completeness, in its scientific trend, and in its practical bearing to clinical problems. Its careful study will be of the greatest value to the ophthalmologist. The text is clear, the illustrations excellent, and the general make-up of the book could not be improved upon.

A. K.

VI.—**The Physiology of Vision, with Special Reference to Color Vision.** By F. W. EDRIDGE-GREEN, M.D., F.R.C.S. Published by G. Bell and Sons, Ltd. London. 1920.

In presenting this work to the medical reading public the author has endeavored to elaborate upon the scientific knowledge of the physiology of the eye as a fitting introduction for his views upon color vision and color blindness. This is very

ably accomplished. Well-known facts are interpreted in a rather new manner, or at least, new to the reviewer. In the opening pages, the doctrine of specific sense energy is elucidated in a most creditable manner. The dioptrics of the eye are likewise very clearly explained, and accommodation is made understandable to the merest tyro. The physiology of the iris is accurately disposed of in a few pages, and the optical defects of the eye are considered at sufficient length for the practical purposes of the work. The action of light upon the retina is discussed very carefully and is a differentiating feature of the work. The function of the visual purple is described in a scientific manner, and not left to the imagination as is so often the case in textbooks on ophthalmology. This entire section is very good. Anyone could read this and obtain a clear view of the subject. This is a characteristic of the entire book, however. Having been led this far very enjoyably through what usually is an ophthalmic maze, one is prepared to accept whatever theory the author may propound as gospel, and is not a little surprised and disappointed when he admits that "very little is known at present of the exact nature of visual impulses and their origin." His theory of vision depends upon the acceptance of the hypothesis that there is a thin layer of a photo-chemically sensitive fluid (the visual purple) corresponding to the sensitive plate of the camera. It is very probable, he states, that light acting upon the visual purple is according to its wave length absorbed by particular molecules, the amplitude of their vibrations being increased. These vibrations may cause corresponding vibrations in certain disks of the outer segments of the cones, which seem especially constructed to take up vibrations. Proceeding from this hypothesis, he elaborates upon the various observations in support of this contention, and disposes of those that seemingly oppose it. This is likewise ably done. The origin of light and dark adaptation is explained by his theory very well indeed. Visual acuity and after images are also well-described. The section on the variations of visual phenomena is especially attractive, and should help us to explain many disturbing symptoms to our patients. The section on binocular single vision is deserving of more than passing mention. As would be expected in a work by a specialist along one particular line,

the section on color vision and color blindness stands in a class by itself. To attempt to abstract even a portion of it for purposes of review would be to risk mutilating it. The prospective reader is urged to study it carefully and he will be amply rewarded in knowledge and information. On the whole the book is most creditable to the author and is certain of a good reception. We wish to extend our congratulations to Dr. Edridge-Green, and to express to him our appreciation of a most enjoyable reading hour with this latest effort of his.

L. WEBSTER FOX.